

-USAFOEHL REPORT - 89-010EQ0178BEF



# COMPLIANCE TESTING OF HOT WATER AND STEAM BOILERS, SHAW AFB SC

JAMES A. GARRISON, Major, USAF, BSC

February 1989

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**Final Report** 

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USAF Occupational and Environmental Health Laboratory
Human Systems Division (AFSC)
Brooks Air Force Base, Texas 78235-5501

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This report has been reviewed and is approved for publication.

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Chief, Air Quality Function

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Chief, Consultant Services Division

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James C. Bock

Commander

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### I. INTRODUCTION

On 8-24 Aug 1988, a stationary source emission survey was conducted at Shaw AFB by personnel of the Air Quality Function, USAF Occupational and Environmental Health Laboratory (USAFOEHL) to determine stack exhaust gas moisture content and velocity for 18 small oil and gas fired boilers. This survey was requested by HQ TAC/DEEV to assist Shaw AFB in obtaining the necessary boiler operating permits required by the State of South Carolina. Personnel involved with on-site testing are listed in Appendix A.

### II. DISCUSSION

### A. Background

Shaw AFB received a consent order from the South Carolina Department of Health and Environmental Control, Bureau of Air Quality Control for not having obtained operating permits for 18 boilers located on the base. Permit applications were then filed, but were returned due to lack of data on moisture content and velocity. USAFOEHL was requested to provide this information so that the base could obtain the necessary operating permits and demonstrate and maintain compliance with all provisions under the South Carolina Department of Health and Environmental Control; Regulation 61-62 - Air Pollution Control Regulations and Standards.

### B. Site Description

The 18 boilers tested ranged in size from  $1.05 \times 106$  to  $8.4 \times 106$  BTU/hr input and were located in 13 separate buildings. The primary purpose of the boilers is to provide steam heat or hot water at the particular location. The location and operating parameters of each boiler are found on the permit applications provided in Appendix B. Typical boilers tested are shown in Figures 1 and 2. Typical stacks and test sites are pictured in Figures 3-8.

### C. Applicable Standards

Permit procedures are defined under Regulation No. 62.1, Air Pollution Control, Section II, Permit Requirements. Emission Standards are defined under Regulation No. 62.5, Air Pollution Control Standards, Standard No.1, Emissions From Fuel Burning Operations. These regulations are provided in Appendix C.

### D. Sampling Methods and Procedures

All stack tests were conducted in accordance with the procedures and analysis methods specified in Chapter 40, Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A, Methods 1-4. Therefore, test methods, equipment, sample train preparations, sampling and recovery, calibration requirements and quality assurance were done in accordance with the methods and procedures outlined in 40 CFR 60, Appendix A.

Sampling ports were installed in the exhaust stack or ducting and traverse points determined for each site in accordance with Method 1.

Exhaust gas moisture content and velocity were determined simulta- neously using the sampling train pictured in Figure 9. The train consisted of a button-hook probe nozzle, heated glass probe, heated glass filter, impingers and pumping and metering device. Flue gas velocity pressure was measured at the nozzle tip using a Type-S pitot tube connected to a 10 inch inclined-verticle manometer. Where stack/duct diameters were less than 12 inches, a detached pitot tube was used so as not to significantly block the duct cross section. A 1-inch inclined manometer was used where gas velocity pressure was less than 0.05 inches of water. Type K thermocouples were used to measure flue gas as well as sampling train temperatures. The probe was heated to minimize moisture condensation. The heated filter was used to remove particulate materials. The impinger train (first, third and fourth impingers; modified Greenburg-Smith type: second impinger; standard Greenburg-Smith design) was used as a condenser to collect stack gas moisture. The pumping and metering system was used to control and monitor the sample gas flow rate. Equipment calibration data is presented in Appendix P.

The sampling time and sample rate for each test run was selected to provide the minimum 21 standard cu ft sample volume and 0.75 cu ft per minute sample rate required by Method 4.

During initial sample runs, flue gas samples for orsat analysis (measures oxygen and carbon dioxide for stack gas molecular weight determination) were taken. Molecular weights determined from these samples averaged about 29.6. This value was assumed for all subsequent calculations. Orsat sampling and analysis equipment are shown in Figures 10 and 11.

Moisture and velocity calculations were done using "Source Test Calculation and Check Programs for Hewlett-Packard 41 Calculators" (EPA-340/ 1-85-018) developed by the EPA Office of Air Quality Planning and Standards, Research Triangle Park NC. This is our standard method for calculating emissions data. Moisture and velocity calculations are found in Appendix Q.

#### III. CONCLUSIONS AND RECOMMENDATIONS

Table 1 provides the survey results for all boilers tested. In some cases, modifications to the stack were made to accommodate the sampling ports. Duct diameters shown were obtained where the ports were installed. Where the inside stack or duct diameter measured during testing was different from that on the permit application, the velocity was corrected to the diameter listed on the application. These results were determined on site and provided to 363 CES/DEEV personnel so that permit application could be initiated immediately.

The USAFOEHL will continue to support Shaw AFB as necessary in this project with consultative and testing assistance.



Figure 1. Heat Plant Steam Boiler

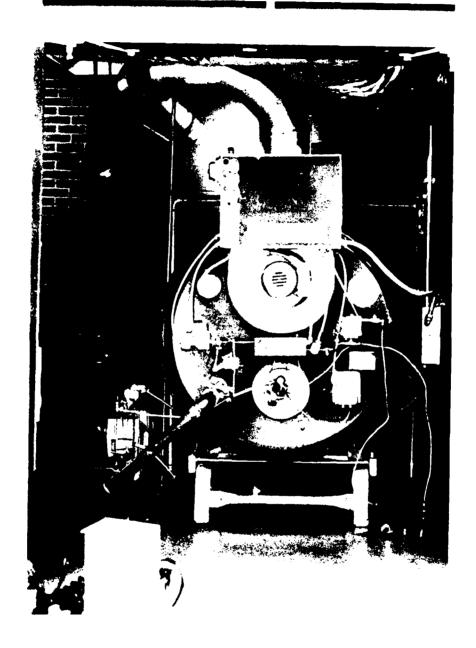


Figure 2. Building 1102, Hot Water Boiler



Figure 3. Building 611, Test Site

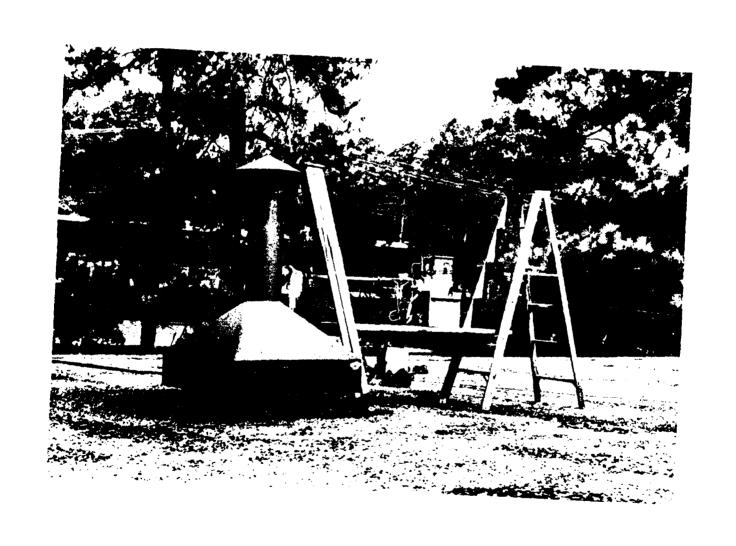


Figure 4. Building 922, Test Site



Figure 5. Building 1046, Test Site

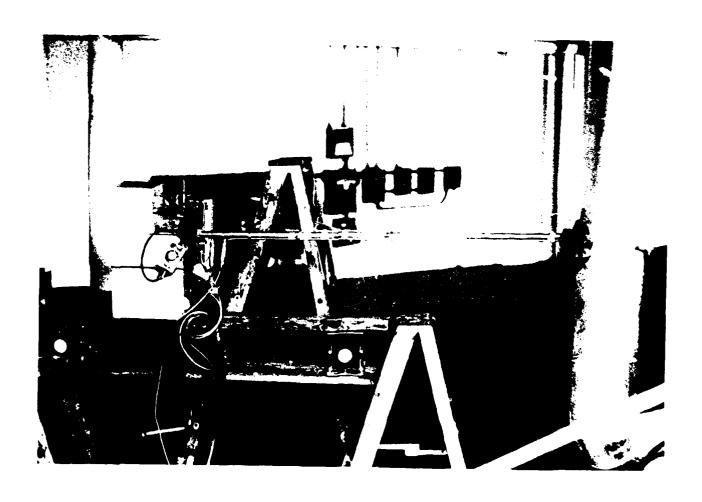


Figure 6. Building 1130, Test Site



Figure 7. Building 1200, Test Site

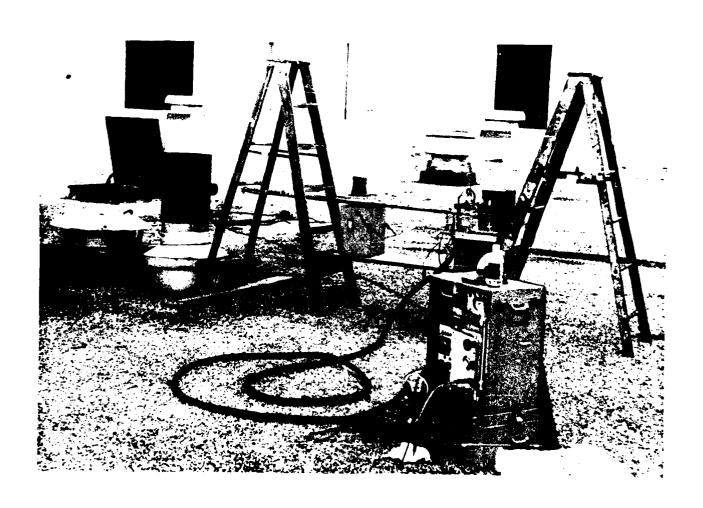


Figure 8. Building 1206, Test Site

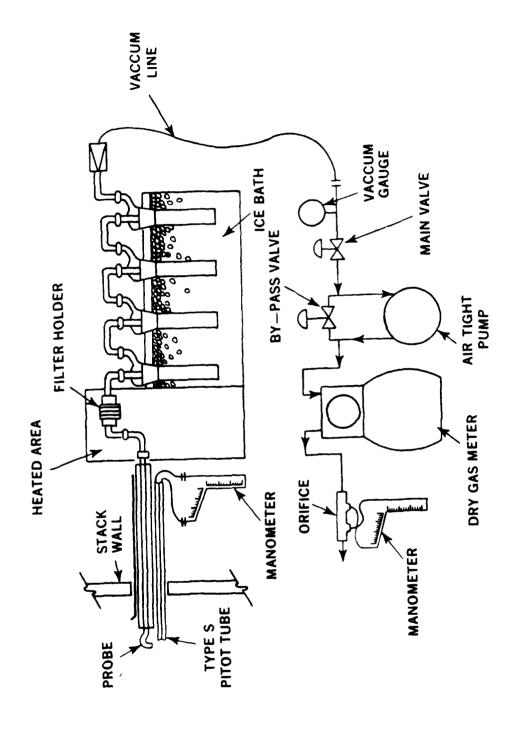


Figure 9. Moisture Sampling Train

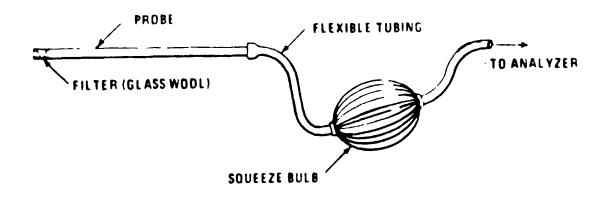


Figure 10. ORSAT Sampling Train

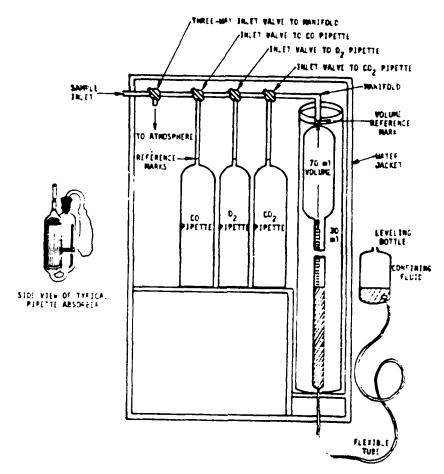


Figure 11. ORSAT Apparatus

TABLE 1 S MOISTURE AND VELOCITY TEST RESULTS

BLDG NO.	TYPE* BOILER	% MOISTURE BY VOLUME	DUCT** DIAMETER (ft)	YELOCITY*** (fps)
403	#2, ST	15.26	1.02(1.00)	30.0
	#3, ST	14.73	1.02(1.00)	27.0
	#5, ST	15.54	1.31(1.66)	26.0(16.0)
611	TZ	11.28	1.15(0.66)	26.0(77.0)
922	нм	7.58	0.66(0.66)	3.0
	ST	19.94	0.81(0.66)	11.0(17.0)
1046	нพ	12.55	1.25(0.66)	15.0(55.0)
1102	н₩	9.90	0.81(0.66)	15.0(23.0)
1130	ST	9.02	0.83(0.66)	28.0(45.0)
1200	#1, ST	9.01	0.78(1.0)	22.0(14.0)
	#2, ST	12.42	0.78(1.0)	11.0(7.0)
	#3, ST	10.88	0.78(1.0)	20.0(13.0)
1206	ST -	10.54	1.16(0.66)	8.0(24.0)
1402	ни	9.50	0.90(0.66)	11.0(20.0)
1422	ни	12.27	1.46(0.66)	9.0(45.0)
1604	нм	10.56	0.63(0.66)	22.0(20.)
1614	<i>€</i> 1, ST	10.65	1.33(1.0)	12.0(21.0)
	#2, ST	9.41	1.33(1.0)	12.0(21.0)

ST = Steam boiler
HW = Hot water boiler

<sup>\*\*</sup> Duct diameter measured during testing. ( ) indicates duct diameter listed on permit.

<sup>\*\*\*</sup> Velocity for duct diameter measured during testing.
( ) indicates stack velocity corrected to stack diameter listed on permit.

### REFERENCES

- 1. "Standards of Performance for New Stationary Sources," Title 40, Part 60, Code of Federal Regulations, July 1, 1987.
- 2. Quality Assurance Handbook for Air Pollution Measurement Systems Volume III, Stationary Source Specific Methods, U.S. Environmental Protection Agency, EPA-600/4-77-027-b, Research Triangle Park, North Carolina, December 1984.
- 3. Source Test Calculation and Check Programs for Hewlett-Packard 41

  Calculators. U.S. Environmental Protection Agency, EPA-340/1-85-018,
  Research Triangle Park, North Carolina, May 1987.

# APPENDIX A Personnel Information

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### Personnel Information

### 1. USAFOEHL Test Team

Maj James Garrison, Chief, Air Quality Function Capt Paul T. Scott, Consultant, Air Resources Meteorologist SSgt Shelley Schelin, Bioenvironmental Engineering Technician SSgt Pietro LaPorta, Bioenvironmental Engineering Technician

USAFOEHL/ECQ Brooks AFB TX 78235-5501

Phone: AUTOVON 240-2891

Commercial (512) 536-2891

### 2. Shaw AFB on-site representatives

Capt Michael Rusden, 363 Medical Group (TAC)/SGPB SSgt Edward Meltz, 363 Medical Group (TAC)/SGPB SSgt Deral Freysinger, 363 Medical Group (TAC)/ SGPB Karl Chandler, 363 CES/DEEV Penny Spell, 363 CES/DEEV Joe Bartlett, 363 CES/DEMMH TSgt Paul Trageser, 363 CES/DEMMH

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APPENDIX B

Permit Applications

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# DO THOM SOUND DESCRIPTION HENCTH AND ENTROMMENTAL CONTROL PUREAU DE AIR QUALITY CONTROL FUEL BURNING PERMIT APPLICATION

Permet No.:

10. No.:

Date:

Reviewed Ey:

١.	Company Auror: SHA	W AFB	i	-51	Date: 20 Apr 88
	Type of E. 1 Derning	operation: St	eam Boiler H	eating 13L	06 403
	Unit less mation: He	eat Plant Boll	ers #2 & #3	·	
2.	Make: Superior Aztec	والمرابع	Model:	5-5-402	<b>.</b>
	Maka: Superior Aztec -Capacity: Rated Input x	2.76 - x 10 <sup>6</sup>	BTU/hr Raman/hr d	ted Output OF and	x 10° BTU/hr PSIG
3.	Fuel Cata condicate al	ll unita):			
-	Tope and Marine Natural Das 163	BTU Concent IS BTU/Ft <sup>2</sup> (CC) DTU/Gal	by Weight NIL  0.17	% Ash by weight NIL	Consumption 3 rated capacity 2666 Ft3/ER 20 GAL/ER
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ID. No.:

Date:

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PE 031		(40),	ontent BTU/Ft <sup>3</sup> SCO 3TU/Na	0.17	MIL	50 Ga1/4R
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Permit No.:

1D. No.:

Date:

Reviewed By:

Unit Designation	: Bidg 611 Boile	er	reacting	Date: 20 Apr 8
Make: Spencer		- Model:	4F-360-50-S	x 10° BTU/hr
	x 103 lbs of s	team/hr d	OF and	PSIG
Fuel Data (indica	ite all units):			
Type and Grade Natural Gas	STU Content 1935 STU/Ft <sup>3</sup>	5 % Sulfur by weight NIL	% Ash by weight NIL	Consumption @ rated capacity 2913 Ft³/HR 21.5 Gal/HR
72 (1)	40,000 370/6a1	0.1	HIL	21.5 Gal/HR
Burner Type (soli Underfeed If Flyash reinjec	ld fuels only): StokerOt tion is to be use	Pulverized ner (specify) ed, give % rei	i Trave	eling Grate
Air Pollution Cor				
Stick Data: Height Above Grou Inside Diameter Est. Moissure Emission Rate at	50 ft Temper. 3 Location rated capacity ( Before	ature <u>°</u> F (UTM or Lat/Lo lb/hr): After	ong) <u>Jid<b>u 51</b>:</u>	
Pollutint		Control Device	Method o Emi	of Estimating Essions
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Art of Assilition	subject to provi	n this unit?	S.C. Hazardou (specify):	s Waste Management

DARENT USE
PERMIC NO.:

ID. No.:
Date:

Reviewed By:

### PART IIA

Company Name: SHAW Type of Fuel Burning ( Unit Designation: B)	AFB			00 4 00
		•		Date: 20 ADT 88
lype of fuel burning (	Operation:	Hot Water Boi	Ter	Date: 20 ADr 88
Unit Designation: - B)	1dg 922 H/W	Boiler		<del></del>
Make: A.O. Smith	<u></u>	Model:	BT 80-916	
Make: A.O. Smith Scapacity: Rated Input	$t_{1.7085} \times 10$	Jo BTU/hr R	ated Output	x 10° BTU/hr
x	103 lbs of s	team/hr d	OF and	2\$1G
Fuel Data (indicate a	ll units):			
Eugl - Eugl	י מיני	% C1 F	" Anin	Concurration
Tuna and Craia	Cantant	hy unich:	5 MSH	3 matri compasity
Type and Grade . Natural Gas 103	95 RTH/F+3	Jy Weight	ey /shane	1651 Follows
100	55 51071 5		<u>-</u>	1991 : 2
Dirner Type (solid fre	els only): _	Pulverised	i Trav	eling Grate
Underfeel Stoke	er Ot:	ter (specify)		
ii ilyash riinjection	is to be use	d, give % rei	njection	
	5	· · · ·	• •	
Air Pollution Control	Device Descr	ription:	i.:	
			<del></del>	
a Dana				
Stack Data:				
Height Above Ground /	is to Ga	ia Malocity	T T / 7 3 0	
manager mouve mounting 2		is reflected—	: 1/560	
Inside Diameter .66 f	ft Tempera	ature OF		•
Inside Diameter .60 in Eat. Moisture	ft Tempera Location (	ature OF (UTM or Lat/Lo	ong) 3 - 12	·: 
Est. Moisture%	location (	(UTM or Lat/Le	r(/sec	:: <del></del>
Est. Moisture%	Location (	(UTM or Lat/Le (5 hr):	re/sec	<u>2</u>
Est. Moisture%	Location ( Location () Before	(UTM or Lat/Lo (b/hr): After	ong) <u>1391111</u>	
Est. Moisture2 Emission Rate at rate.	Location ( Location ( Before Control	(UTM or Lat/Lo lb/hr): After Control	ong) <u> </u>	of Estimating
Height Above Ground 2 Inside Diameter .66 i Est. Moisture	Location ( Location () Before Control Device	(UTM or Lat/Lo (b/hr): After	ong) <u>1391111</u>	of Estimating
Est. Moisture%  Emission Rate at rate.  Pollutant	Location () Espacing () Before Control Device	(UTM or Lat/Lo lb/hr): After Control Device	ong) <u> </u>	of Estimating issions
Est. Moisture% Emission Rate at rate.	Location () Espacing () Before Control Device	(UTM or Lat/Lo lb/hr): After Control Device	Method (Em.	of Estimating issions
Est. Moisture	Location () Before Control Device	(UTM or Lat/Lo lb/hr): After Control Device	Method (Em. 12 12 12 12 12 12 12 12 12 12 12 12 12	of Estimating issions Nec 72
Zat. Moisture	Location () Espacing () Before Control Device	(UTM or Lat/Lo lb/hr): After Control Device	Method (Em. 12 12 12 12 12 12 12 12 12 12 12 12 12	of Estimating issions
Zat. Moisture%  Emission Rate at rate.  Pollutant  Particulate Matter  S0g (0) (0)	Location () Before Control Device	(UTM or Lat/Lo lb/hr): After Control Device	Method (Em. 12 12 12 12 12 12 12 12 12 12 12 12 12	of Estimating issions Nec 72
Est. Moisture	Location () Before Control Device	(UTM or Lat/Lo lb/hr): After Control Device	Method (Em. 12 12 12 12 12 12 12 12 12 12 12 12 12	of Estimating issions Nec 72
Est. Moisture	Location () Before Control Device	(UTM or Lat/Lo lb/hr): After Control Device	Method ( Em. 12 15 1	of Estimating issions Nec 72
Est. Moisture 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Location () Before Control Device .MCS .USC	(UTM or Lat/Lo	Method (Em. 12 17 17 17 17 17 17 17 17 17 17 17 17 17	of Estimating issions  Nec 72  Nec 74  Unit 04
Zat. MoistureZ  Emission Rate at rate.  Pullutant  Particulate Matter  SCo (0)  DO: Other (specify):  Ann any mut (n) subj	Location () Before Control Device Signature ANOS LOCATION	(UTM or Lat/Lo (b)hr):     After     Control     Device	Method (Em. 12 07 12 12 12 12 12 12 12 12 12 12 12 12 12	of Estimating issions  Nec 74  Yet 94  This is Waste Himogement
Zat. MoistureZ  Emission Rate at rate.  Pollutant  Particulate Matter  SOc (6)  (6)  (6)  (7)  Other (specify):  Ann any materials subj	Location () Before Control Device Signature ANOS LOCATION	(UTM or Lat/Lo (b)hr):     After     Control     Device	Method (Em. 12 07 12 12 12 12 12 12 12 12 12 12 12 12 12	of Estimating issions  Nec 74  Yet 94  This is Waste Himogement
Zat. MoistureZ  Emission Rate at rate.  Pullutant  Particulate Matter  SCo (0)  DO: Other (specify):  Ann any mut (n) subj	Location () Before Control Device	(UTM or Lat/Le (b)hr):     After     Control     Device	Method (Em. 12 07 12 12 12 12 12 12 12 12 12 12 12 12 12	of Estimating issions  Nec 74  Yet 94  This is Waste Himogement
Est. Moisture	Location () Before Control Device	(UTM or Lat/Lo (b)hr):     After     Control     Device	Method (Em. 12 15 15 15 15 15 15 15 15 15 15 15 15 15	of Estimating issions  Rec 74  Mec 74
Zat. Moisture Zata.  Emission Rate at rate.  Particulate Matter SCa (b) (c) (c) (c) (c) (c) (c) (c) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d	Location () Before Control Device	(UTM or Lat/Lo (b)hr):     After     Control     Device	Method (Em. 12 15 15 15 15 15 15 15 15 15 15 15 15 15	of Estimating issions  Rec 74  Mec 74
Est. Moisture	Location () Before Control Device	(UTM or Lat/Lo (b)hr):     After     Control     Device	Method (Em. 12 15 15 15 15 15 15 15 15 15 15 15 15 15	of Estimating issions  Rec 74  Mec 74
Est. Moisture	Location () Before Control Device	(UTM or Lat/Le (b)hr):     After     Control     Device	Method (Em. 12 17 12 12 12 13 13 13 13 13 13 13 13 13 13 13 13 13	of Estimating Essions  Dec 72 Yet 72 Yet 44 Yet 44 Yet 45 Yet 54
Est. Moisture 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Location () Before Control Device	(UTM or Lat/Le (b)hr):     After     Control     Device	Method (Em. 12 17 12 12 12 13 13 13 13 13 13 13 13 13 13 13 13 13	of Estimating Lssions  Dec 72 Year 14 Dec 14 Dec 15 Lssions  Is Wasta Management

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Permet No.:

10. No.:

Date:

Reviewed By:

^	Crane	1.4 - 20	Street Section 1	Wadal •	615_N_51_	2 MD
<u>-</u> .	Capacity: Rated	Input 1	.722 × 10	o BTU/hr R	ated Output	x 100 Bin us -
		× 103	lbs of st	eam/hr J	OF and	2 NP x 10° Blu/nr - PSIG
	- Fuel Data (indica					
	Toma Table 1	, !	3TJ · ·	% Sulfur	" % Ash	Consumption
	Type and Orude	Co:	itent	by weight	by weight	3 rated capacity
	Nat <b>ru</b> al Gas	1035	310/553		M I I	1651 F+1/HD
	<u> </u>	140.00	JU 5:0/			
	- -Burner Type (soli	d fuels	only):	Polyerize	d Trav	eling Grate
	Underfeed	Stoker	Ota	er (specify)		
	If flyash reinject	tion is	to be used	i, give i rei	injection	
_						
	Air Pollution Con	trol Dev	rice Descri	iption: _ <u>_U</u> /		
	Stack Data:					
	Stack Data:	nd 25		s Velocity	 Ît/sec	
	Stack Data: Height Above Grou Inside Diameter	nd <u>25</u>		s Velocity ture	ft/sec	
	Stack Data: Height Above Grou Inside Diameter Est. Moisture	nd 25 .30 ft	ft Gas	s Velocity_ tureOF JTM or Lat/L	ft/sec ong)31d= 93	20
<b>5</b> .	Height Above Grou Inside Diameter Est. Moisture	š I	_ft Gas Temperat Location (U	JTM or Lat/Lo	ft/sec ong)Dldq 93	22
<b>5</b> .	Height Above Grou Inside Diameter	š I	_ft Gas Temperat Location (U	JTM or Lat/Lo o,hr):	ft/sec ong)Dldq 93	20
<b>5</b> .	Height Above Grou Inside Diameter Est. Moisture	% I	ft Gas Temperat Location (Capacity (18 Before	JTM or Lat/Lo o,hr): After	ong) <u> 1144 92</u>	
<b>5</b> .	Height Above Grou Inside Dismeter Est. Moisture Emission Rute at	% I	ft Gas Temperat Location (Capacity (18 Before Control	JTM or Lat/Lo p,hr): After Control	ong) <u> 1144 92</u> Method	of Estimating
<b>5</b> .	Height Above Grou Inside Diameter Est. Moisture	% I	_ft Gas Temperat Location (Lapacity (La Before Control Device	JTM or Lat/Lo o,hr): After	ong) <u> 1144 92</u> Method	of Estimating
<b>5</b> .	Height Above Grou Inside Dismeter Est. Moisture Emission Rute at	% I	_ft Gas Temperat Location (Lapacity (La Before Control Device	JTM or Lat/Lo p,hr): After Control	ong)	of Estimating issions
ó.	Height Above Grou Inside Diameter Est. Moisture Emission Rate at:  Pollutant Particulate Matta Soc	% I	_ft Gas Temperat Location (Lapacity (La Before Control Device	JTM or Lat/Lo p,hr): After Control	ong) <u> D1da 92</u> Method : Em	of Estimating issions
ó.	Height Above Grou Inside Diameter Est. Moisture Emission Rate at a Pollutant Particulate Matta	% I	_ft Gas Temperat Location (Lapacity (La Before Control Device	JTM or Lat/Lo p,hr): After Control	Method = Method = Em   Method = Em   Method = Me	of Estimating issions
ó.	Height Above Grou Inside Diameter Est. Moisture Emission Rate at:  Pollutant Particulate Matta 800 60 70.	% I	ft Gas Temperat Location (Capacity (18 Before Control Device	JTM or Lat/Lo p,hr): After Control	Method Em   12 290   12 290   12 290	of Estimating issions
<b>5</b> .	Height Above Grou Inside Diameter Est. Moisture Emission Rate at:  Pollutant Particulate Matta Soc	% I	_ft Gas Temperat Location (Lapacity (La Before Control Device	JTM or Lat/Lo p,hr): After Control	Method = Method = Em   Method = Em   Method = Me	of Estimating issions
<b>5</b> .	Height Above Grou Inside Diameter Est. Moisture Emission Rate at:  Pollutant Particulate Matta 800 60 70.	% I	_ft Gas Temperat Location (Lapacity (La Before Control Device	JTM or Lat/Lo p,hr): After Control	Method = Method = Em   Method = Em   Method = Me	of Estimating issions
<i>5</i> .	Height Above Grou Inside Diameter Est. Moisture Emission Rate at:  Pollutant Particulate Matta 800 60 70.	% I	_ft Gas Temperat Location (Lapacity (La Before Control Device	JTM or Lat/Lo p,hr): After Control	Method = Method = Em   12 Cac   AP   12 Cac   AP   12 Cac   AP   42 Cac   AP   AP   AP   AP   AP   AP   AP   A	of Estimating issions
	Height Above Grou Inside Diameter Est. Moisture Emission Rute at a  Pollutant Particulate Musta SOc CO Vol. Other (apecify):	rated co	ft Gas Temperat Location (Capacity (18 Before Control Device	JTM or Lat/Le  o,hr):  After Control Device	Method = Method = Em	of Estimating issions 94 94 94
	Height Above Grou Inside Diameter Est. Moisture Emission Rute at a  Pollutant Particulate Motte SOc CO Vol. Other (apecify):	rated co	ft Gas Temperat Location (Capacity (18 Before Control Device	JTM or Lat/Le  o,hr):  After Control Device	Method = Em   Method = Em   Method = Em   Method = Em   Method = M	of Estimating issions  94  94  94  94  84  84
	Height Above Grou Inside Diameter Est. Moisture Emission Rute at a  Pollutant Particulate Musta SOc CO Vol. Other (apecify):	rated co	ft Gas Temperat Location (Capacity (18 Before Control Device	JTM or Lat/Le  o,hr):  After Control Device	Method = Em   Method = Em   Method = Em   Method = Em   Method = M	of Estimating issions  94  94  94  94  84  84
	Height Above Grou Inside Dismeter Est. Moisture Emission Rute at a  Pollutant Particulate Matta COp CO Val Other (specify):	rated co	ft Gas Temperat Location (Capacity (18 Before Control Qevice 13 15 15 15 15 15 15 15 15 15 15 15 15 15	JTH or Lat/Le  o,hr):  After Control Device	Method   Em   12 Pec   AP   12	of Estimating issions  94  94  94  94  84  84

### atan saaa saa SOUTH CAR LOVA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL OUT OF ARROY OF ARROYALITY CONTROL FUEL BURNING PERMIT APPLICATION

DURLAG GE | Permet No.: ID. No.: Date: Apr 88

2.	Make: Peerless	****** 4 **** 1.00	Model:	0-714-FD-W	x 105 BTU/hr
	- Capacity: Raced	1.03 103 01 ate	eum/lir d	or and	rSiG
j.	Fuel Data (indies	ite all units):			
	Fuel	) BTU	% Sulfur	% Ash	Consumption 3 rated capacity 117/Ft3/HR
	Type and Grais Natural des	Content	by weight	by weight	117/5+3/µn
	- 1 <b>a</b> 5 <b>u</b> 1 <b>u</b> 1 <b>u</b> 2 <b>o</b> 1 <b>i</b>	1035 3TU/Ft3	3.17	NIL	3.65 Ral/12
				<del></del>	
4.	Burner Type (soli	.i fuels only):	Pulverize	i Trave	eling Grate
	Underfoed	itoker Other time is to be used	er (specify)		
	,		<u> </u>		<del></del>
5.	Air Pollution Con	etrol Device Descri	lption:	URS	······································
б.	Stack Data:		,		
б.	Stack Data: Height Above Grow	ind <sup>22</sup> ft Gas	velocity	ft/sec	
<b>6</b> .	Stack Data:  Neight Above Grou Inside Diameter	📑 ft Temperat	ure OF		.6
6.	Stack Data:  Neight Above Grou Inside Diameter	nd 25 ft Gas Sift Temperat Sign Location (U	ure OF		.6
	Stack Data:  Neight Above Grou Inside Diameter	<pre>1 ft Temperat 2 Location (U rital capacity (1)</pre>	ure	ong) <u>61dg 104</u>	
	Stack Data: Height Above Grou Inside Diameter - Est. Moisture	<pre>1 ft Temperat 2 Location (U rital capacity (1)</pre>	ure	ong) <u>61dg 104</u>	
	Stack Data: Height Above Grou Inside Diameter - Est. Moisture	Temperate Location (United capacity (1b) Before Control	ure		of Estimating
	Stack Data:  Weight Above Grow Inside Diameter Est. Moisture  Emission Rate in  Pollutant	Temperate Location (United capacity (1b) Before Control Control	ture OF TM or Lat/Lat/Lat/Lat/Lat/Lat/Lat/Lat/Lat/Lat/	ong) <b>61dg 104</b> Method o Emi	of Estimating .ssions
	Stack Data: Neight Above Grou Inside Diameter Est. Moisture Umination Rute at	Temperate Location (United capacity (15 Before Control	ture Or TM or Lat/Lat/Lat/Lat/Lat/Lat/Lat/Lat/Lat/Lat/	ong) <b>61dg 104</b> Method o Emi	of Estimating Essions <b>Dec</b> 84
	Stack Data:  Weight Above Grow Inside Diameter Est. Moisture  Emission Rate in  Pollutant	Temperate Location (United Capacity (15 Before Control Period Control Period Control Capacity (15 Period Control Capacity (15 Period Capacity (15	Ture OF  TM or Lat/Lo  o/hr):  After  Control  Devise	Method of Emi AP 42 AP 42	DEC 84
	Stack Data:  Neight Above Grow Inside Diameter Est. Moisture  Umination Rute at  Pollutant  Particulate Matter  (2) (3) (4)	Location (United Capacity (15 Before Control Capacity)  1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Ture OF  TM or Lat/Lo  o/hr):  After  Control  Devise	Method of Emi AP 42 AP 42	of Estimating Ssions Dec 84 Dec 84
	Stack Data:  Weight Above Grow Inside Diameter Est. Moisture  Emission Rate in  Pollutant	Temperate Location (United Capacity (15 Before Control Period Control Period Control Capacity (15 Period Control Capacity (15 Period Capacity (15	Ture OF  TM or Lat/Lo  o/hr):  After  Control  Devise	Method of Emi AP 42 AP 42	DEC 84
	Stack Data:  Neight Above Grow Inside Diameter Est. Moisture  Umination Rute at  Pollutant  Particulate Matter  (2) (3) (4)	Temperate Location (United Capacity (15 Before Control Period Control Period Control Capacity (15 Period Control Capacity (15 Period Capacity (15	Ture OF  TM or Lat/Lo  o/hr):  After  Control  Devise	Method of Emi AP 42 AP 42	DEC 84
7.	Stack Data:  Meight Above Grow Inside Diameter - Est. Moisture  Emission Rate it  Pollutant  Particulate Matter (); (); (); (); (coner (specify):	Temperate Location (Virtual capacity (15 Before Control Aperica) (10 100 100 100 100 100 100 100 100 100	Ture Or  This or Lat/Lo  o,hr):  After  Control  Devise	Method of Emi  AP 42  AP 42  AP 42  AP 42	Dec 84 Dec 84 Dec 84 Dec 84
7.	Stack Data:  Beight Above Grow Inside Diameter Est. Moisture  Emission Rate it  Pollutant  Particulate Matter  (1) (0) (1) (ctner (specisy):	Temperate Location (Virtual capacity (15 Before Control Agerica)  1 004 007 007 007 007 007 007 007 007 007	ions of the	Method of Emi AP 42 AP 42 AP 42 AP 42 AP 42	DEC 84
7.	Stack Data:  Beight Above Grow Inside Diameter Est. Moisture  Emission Rate it  Pollutant  Particulate Matter  (1) (0) (1) (ctner (specisy):	Temperate Location (Virtual capacity (15 Before Control Aperica) (10 100 100 100 100 100 100 100 100 100	ions of the	Method of Emi AP 42 AP 42 AP 42 AP 42 AP 42	DEC 84
7.	Stack Data: Reight Above Grow Inside Diameter - Est. Moisture  Emission Rate at  Pollutant  Particulate Matte  You  coner (speciage:  Act or Resulution	Temperate Location (United Capacity (15 Before Control Device Cont	ions of the third unit?	Method of Emi AP 42	DEC 84

Parmet vo.: ID. No.: Date: Reviewed Sy:\_

از خچلېت. د مياست	Company Name: S Type of Fuel Burni	ing Operation: 1	ot Water Bot	1 or	-
	Unit Designation:	Bldg 1102 H/\f	Boiler	161	······································
		<u> </u>		<u> </u>	<del></del>
2	Make: <u>Cleaner-Br</u> Capacity: Rated I	rooks —	Model_	CB H186-50	enter en
٠٠ مديو ۽ فسرو	'Capacity: -Rated I	Input <b>1.95</b> x 10	0 BTU/hr -Ra	ited Output	<u>π x 100 BTU/hr</u>
		$\times$ 10 <sup>3</sup> lbs of st	ream/hr d	OF and	PSIG
3	Fuel Data (indicat	ta all unita).			
٠.					
	Fuel "	BTU STORES	Sulfur	% Ash	Consumption
					9 rated capacity
	#2 011	140,000 BTU/Gal	0.17	NIL	14 341 -5
				<del></del>	
	D	3 5 -1	D., 1, 4	· · · · · · · · · · · · · · · · · · ·	alima Curi
<b>-</b> .	Burner Type (solid	d ideis only):	rulverized	rav	ering Grate
	Underfeed S If flyash reinject	stokerOta	d and " was	nizarion	
	tt liyasa telajett	ran is to be use	a, give a rei	njection	<del></del>
=	Air Pollution Cont	tral Davisa Davis	intion	ione	
٠.	ALL FULLSCLUTT COME	rior agains asser			
	1 12. 12				
- 6					
·6.	Stack Data:	nd 25 fr Ga	s Velocity	ft/sec	
·6.	Stack Data:	nd 23 ft Ga	s Velocity	ft/sec	
·6.	Stack Data:	nd 25 ft Ga 52 ft Tempera 3 Location (	s Velocity ture OF	ft/sec	C2
· 6.		nd 25 ft Ga 50 ft Tempera - Location (	s Velocity ture OF UTM or Lat/Lo	ft/sec	<u>cc</u>
	Stack Data: Height Above Groun Inside Diameter • Est. Moisture			ft/sec ong) <u>2:cc_11</u>	CC
	Stack Data:	rated capacity (1	b/hr):	ft/sec ong)21cc_11	<u>C2</u>
	Stack Data: Height Above Groun Inside Diameter • Est. Moisture	rated capacity (I Before	b/hr): After		
	Stack Data: Height Above Groun Inside Diameter . Est. Moisture Emission Rate at r	rated capacity (1 Before Control	b/hr): After Control	Method (	of Estimating
	Stack Data: Height Above Groun Inside Diameter • Est. Moisture	rated capacity (I Before	b/hr): After Control		of Estimating
7.	Stack Data: Height Above Groun Inside Diameter • Est. Moisture Emission Rate at r	rated capacity (1 Before Control Device	b/hr): After Control	Method (	of Estimating
7.	Stack Data: Height Above Groun Inside Diameter . Est. Moisture Emission Rate at r	rated capacity (1 Before Control Device	b/hr): After Control	Method (	of Estimating
7.	Stack Data: Height Above Groun Inside Diameter • Est. Moisture  Emission Rate at r  Pollitant Particulate Matter 502	rated capacity (1 Before Control Device	b/hr): After Control	Method ( Em.	of Estimating issions 202 0" 220 02
	Stack Data: Height Above Groun Inside Diameter • Est. Moisture  Emission Rate at r  Pollitant Particulate Matter	rated capacity (1 Before Control Device	b/hr): After Control	Method (Em.	of Estimating issions  202 0"  204 02
7.	Stack Data: Height Above Groun Inside Diameter • Est. Moisture  Emission Rate at r  Pollitant Particulate Matter 502	rated capacity (1 Before Control Device	b/hr): After Control	Method (Em.	of Estimating issions 202 0" 220 02
7.	Stack Data: Height Above Groun Inside Diameter . Est. Moisture  Emission Rate at r  Pollimant Particulate Matter 502 CO Won	rated capacity (1 Before Control Device	b/hr): After Control	Method (Em.	of Estimating issions  202 0"  204 02
7.	Stack Data: Height Above Groun Inside Diameter . Est. Moisture  Emission Rate at r  Pollimant Particulate Matter 502 CO Won	rated capacity (1 Before Control Device	b/hr): After Control	Method (Em.	of Estimating issions  202 0"  204 02
7.	Stack Data: Height Above Groun Inside Diameter . Est. Moisture  Emission Rate at r  Pollimant Particulate Matter 502 CO Won	rated capacity (1 Before Control Device	b/hr): After Control	Method (Em.	of Estimating issions  202 0"  204 02
7.	Stack Data: Height Above Groun Inside Diameter • Est. Moisture Emission Rate at r  Pollitant Particulate Matter 502 CO Wing Other (specify):	rated capacity (1  Before Control Device	b/hr): After Control Device	Method of Em.	of Estimating issions  202 0"  203 04  200 94
<ol> <li>3.</li> </ol>	Stack Data: Height Above Groun Inside Diameter • Est. Moisture Emission Rate at r  Pollimant Particulate Matter 502 CO Wing Other (specify): Are any outerials	rated capacity (1  Before Control Device	b/hr): After Control Device	Method (Em. 10 10 10 10 10 10 10 10 10 10 10 10 10	of Estimating Issions  202 07  207 02  20 94  Factor  Is Wester Management
<ol> <li>3.</li> </ol>	Stack Data: Height Above Groun Inside Diameter • Est. Moisture Emission Rate at r  Pollitant Particulate Matter 502 CO Wing Other (specify):	rated capacity (1  Before Control Device	b/hr): After Control Device	Method (Em. 10 10 10 10 10 10 10 10 10 10 10 10 10	of Estimating Issions  202 07  207 02  20 94  Factor  Is Wester Management
<ol> <li>3.</li> </ol>	Stack Data: Height Above Groun Inside Diameter • Est. Moisture Emission Rate at r  Pollimant Particulate Matter 502 CO Wing Other (specify): Are any outerials	rated capacity (1  Before Control Device	b/hr): After Control Device	Method (Em. 10 10 10 10 10 10 10 10 10 10 10 10 10	of Estimating Issions  202 07  207 02  20 94  Factor  Is Wester Management
7.	Stack Data: Height Above Groun Inside Diameter . Est. Moisture  Emission Rate at r  Pollitant Particulate Matter S02 C0 Wing Other (specify):  Accompositions	arated capacity (1  Before Control Device 322 323 327 327 327 327 327 327 327 327	b/hr): After Control Device	Method (	of Estimating issions  202 0"  202 0"  203 94  Fac 11
7.	Stack Data: Height Above Groun Inside Diameter . Est. Moisture  Emission Rate at r  Pollitant Particulate Matter S02 C0 Wing Other (specify):  Accompositions	arated capacity (1  Before Control Device 322 323 327 327 327 327 327 327 327 327	b/hr): After Control Device	Method (	of Estimating issions  202 0"  202 0"  203 94  Fac 11
7.	Stack Data: Height Above Groun Inside Diameter . Est. Moisture  Emission Rate at r  Pollitant Particulate Matter S02 C0 Wing Other (specify):  Accompositions	arated capacity (1  Before Control Device 322 323 327 327 327 327 327 327 327 327	b/hr): After Control Device	Method (	of Estimating Issions  202 07  207 02  20 94  Factor  Is Wester Management
3.	Stack Data: Height Above Groun Inside Diameter . Est. Moisture  Emission Rate at r  Pollitant Particulate Matter S02 C0 Wing Other (specify):  Accompositions	aubivet to process to december 1992	b/hr): After Control Device  stons of the third min!	Method of Em.	of Estimating issions  202 Of Carlot

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PERMICE NO.:

ID. No.: Datz: Reviewed By:

				1	<del></del>
	Type of Fuel Burn	ing Operation:	Steam Soller I	reating	Date: 20 Apr
	Unit Designation:	B100 1130 BC	nier		<del></del>
	Maka Vousnan	المارية	Model:		x 10° BTU/hr
•	Capacity: Rated	Tanut 2 522 v	· 100 BTU/br B	lated Output	v 100 RTU/hr
	capacaty. Nates	v 103 1bs of	steam/hr d	or and	PSIG
			300000		
	Fuel Data (indica	ce all units):			
	Fuel "	BTU	% Sulfur	% Ash	Consumption
	Type and Grade	Content	by weight		@ rated capacity
	Matural Gas	1035 BTU/Ft3	MIL	NIL	2476 Ft3/HR
	/2 011	140,000 ETU/	<u>Gai</u>	<u> </u>	13.3 Galukk
				_	
•	Burner Type (soli	d tuels only:	Pulverise	ra Trav	eling Grate
	Underfeel If flyash reinjec	Stoker	Other (specity)		
	ri grhasu merulec.	tion is to be t	used, give 5 re	injection	
				_	
-	Air Pollution Con	trol Device De	scription:	13	
	Stack Data: Height Above Grou Inside Diameter	<b>. 65</b> ft Temp	erature of		•
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at	.66 ft Temp  Locatio  rated capacity  Before  Contro	erature or n (UTM or Lat/L (15/hr): After 1 Control	ong) <u>Side If</u> Method	of Estimating
	Height Above Grou Inside Diameter	.66 ft Temp  Locatio  rated capacity  Before  Contro	erature or n (UTM or Lat/L (15/hr): After	ong) <u>Side If</u> Method	
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at	.66 ft Temp Locatio  rated capacity Before Contro Device	erature or n (UTM or Lat/L (15/hr): After 1 Control	ong) <u>Side If</u> Method	of Estimating
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at Pollutant	.66 ft Temp  Locatio  rated capacity  Before  Contro  Device	erature or n (UTM or Lat/L (15/hr): After 1 Control	ong) <u>Side If</u> Method	of Estimating
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at  Pollutant Particulate Matte	.66 ft Temp Locatio  rated capacity Before Contro Device	erature or n (UTM or Lat/L (15/hr): After 1 Control	ong) <u>3100 13</u> Method  Em	of Estimating
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at  Pollutant Particulate Matte 502 CO	.66 ft Temp Locatio  rated capacity Before Contro Device	erature or n (UTM or Lat/L (15/hr): After 1 Control	ong) <u>3100 13</u> Method  Em	of Estimating issions
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at  Pollutant Particulate Matte	.66 ft Temp Locatio  rated capacity Before Contro Device	erature or n (UTM or Lat/L (15/hr): After 1 Control	ong) <u>3100 13</u> Method  Em	of Estimating issions Clock C:
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at  Pollutant Particulate Matte 502 CO	.66 ft Temp Locatio  rated capacity Before Contro Device	erature or n (UTM or Lat/L (15/hr): After 1 Control	ong) <u>3100 13</u> Method  Em	of Estimating issions C Cou C: C Day C:
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at  Pollutant Particulate Matte 502 CO	.66 ft Temp Locatio  rated capacity Before Contro Device	erature or n (UTM or Lat/L (15/hr): After 1 Control	ong) <u>3100 13</u> Method  Em	of Estimating issions C Cou C: C Day C:
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at  Pollutant Particulate Matte 502 CO Vol. Other (specify):	.66 ft Temp  Locatio  rated capacity  Before  Contro  Device	erature Op n (UTM or Lat/L (Ib/hr): After 1 Control Device	Method Em	of Estimating issions  2
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at  Pollutant Particulate Matte 502 CO Vol. Other (specify):	### Appendix of the control of the c	erature Op n (UTM or Lat/L (Ib/hr): After 1 Control Device	Method Em	of Estimating issions  2
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at  Pollutint Particulate Matte Soc Co Wall Other (specify): Act or Regulation.	.66 ft Temp  Locatio  rated capacity  Before  Contro  Device	erature Op n (UTM or Lat/L (Ib/hr): After 1 Control Device 22 24 25 27 27 27 27 27 27 27 27 27 27	Method Em  Method Em  10  10  10  10  10  10  10  10  10  1	of Estimating issions
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at  Pollutint Particulate Matte Soc Co Wall Other (specify): Act or Regulation.	.66 ft Temp  Locatio  rated capacity  Before  Contro  Device	erature Op n (UTM or Lat/L (Ib/hr): After 1 Control Device 22 24 25 27 27 27 27 27 27 27 27 27 27	Method Em  Method Em  10  10  10  10  10  10  10  10  10  1	of Estimating issions  2 200 01 - 050 04 2 200 41 - 100 41
	Height Above Grou Inside Diameter Est. Moisture Emission Rate at  Pollutint Particulate Matte Soc Co Wall Other (specify): Act or Regulation.	.66 ft Temp  Locatio  rated capacity  Before  Contro  Device	erature Op n (UTM or Lat/L (Ib/hr): After 1 Control Device 22 24 25 27 27 27 27 27 27 27 27 27 27	Method Em  Method Em  10  10  10  10  10  10  10  10  10  1	of Estimating issions  2

BUREAU LSE
Permit No.:

ID. No.:
Date:
Reviewed By:

### PART IIA

At Total feet Sun Control Device Description: Steam Boiler Heating Total Steam Control Device Description: Steam Boiler Heating Total Steam Control Device Description: Steam Control Device Description: Steam Control Device Description: Steam Control Cont		Arvas of Fust Buraino	, -r	7 //4 2 //2		· · · · · · · · · · · · · · · · · · ·		
Model:   Temperature   Model:   Temperature   PSTO   Stank Data:   Height Above Ground   St Data:   Height Above Ground   Height A	ر خ.	Hade Decimantion:	Plda 1200 Roj	Darc Bl & B/				
Capacity: "Rated Input 2.00 x 100 BTU/hr Rated Output x 100 BTU/hr x 1		Unit besignation.	D124 1200 001	1613 41 9 75				
Capacity: "Rated Input 2.00 x 100 BTU/hr Rated Output x 100 BTU/hr x 1	-3	Kewanee		Model:		e e e e		
3. Fuel Data (indicate all units):  Type and judge   Selfur   % Ash   Consumption   Type and judge   Content   by weight   by weight   2 rated capacity   Natural Gas   1035   1945-3   NIL   MIL   2415   51440	-2 •	Carration - Parad Inc	WE 2.50 V 10	10 BTH/hr Rat	ed Output	x 106 BTU/hr		
3. Fuel Data (indicate all units):    Type and Stade		Capacity: Rated in	107 :50 25 05	-sam/br 4	Or and	PSTG		
Type and Drade   Content   by weight   by weight   3 rated capacity   Natural Gas   1935 378/874   NIL   NIL   2415 878/88		`	( 102 TB2 OF 20					
Type and Drade   Content   by weight   by weight   3 rated capacity   Natural Gas   1935 378/874   NIL   NIL   2415 878/88	_		11					
Type and Grade   Content   Day weight   Day weight   Strated capacity   Natural Gas   1935   1977   Mil   Mil   2415 Ft   748	3.	Fuel Data (indicate	all units):					
Type and Gas				# 0 15	% A - h	Concumption		
Natural Gas   1935 378/FT   NIL   MIL   2415 Ft/HB   120 011   120 01 0000   0.10   MIL   13 241/49				% Sultur	% ASII	3 rated constitu	-	
4. Barner Type (solid fuels only): Pulverized Traveling Grate		Type and Grade	Content				•	
4. Burner Type (solid fuels only): Pulverized Traveling Grate    Enderfeed Stoker		Natural Gas 1	035 3 U/F 14	- 411				
Inderfeed Stoker Other (specify)  If flyish reinjection is to be used, give % reinjection.  5. Air Pollution Control Device Description: "Cone  6. Stack Data: Height Above Ground 30 ft Gas Velocity ft/sec Indid Diameter 1.0 ft Temperature OF Est. Moisture 7 Location (UTM or Lat/Long) Sidg 1200  7. Emission Rate at rated capacity (lb/hr): Before After Control Control Method of Estimating Pullulant Device Emissions  Particulate Matter 1.0 ft April 1.0 Emissions  Particulate Matter 1.0 ft April 1.0 April		/2_0i11	<u>40. (C. 1717)</u>	<u> </u>		19 931,49		
Inderfeed Stoker Other (specify)  If flyish reinjection is to be used, give % reinjection.  5. Air Pollution Control Device Description: "Cone  6. Stack Data: Height Above Ground 30 ft Gas Velocity ft/sec Indid Diameter 1.0 ft Temperature OF Est. Moisture 7 Location (UTM or Lat/Long) Sidg 1200  7. Emission Rate at rated capacity (lb/hr): Before After Control Control Method of Estimating Pullulant Device Emissions  Particulate Matter 1.0 ft April 1.0 Emissions  Particulate Matter 1.0 ft April 1.0 April								
Inderfeed Stoker Other (specify)  If flyish reinjection is to be used, give % reinjection.  5. Air Pollution Control Device Description: "Cone  6. Stack Data: Height Above Ground 30 ft Gas Velocity ft/sec Indid Diameter 1.0 ft Temperature OF Est. Moisture 7 Location (UTM or Lat/Long) Sidg 1200  7. Emission Rate at rated capacity (lb/hr): Before After Control Control Method of Estimating Pullulant Device Emissions  Particulate Matter 1.0 ft April 1.0 Emissions  Particulate Matter 1.0 ft April 1.0 April								
Inderfeed Stoker Other (Specify)  If flyish reinjection is to be used, give "reinjection.  5. Air Pollution Control Device Description: "Cone  6. Stack Data:      Height Above Ground Do ft Gas Velocity ft/sec								
Inderfeed Stoker Other (Specify)  If flyish reinjection is to be used, give "reinjection.  5. Air Pollution Control Device Description: "Cone  6. Stack Data:      Height Above Ground Do ft Gas Velocity ft/sec	<u>.</u>	Burner Type (solid fuels only): Pulverized Traveling Grate						
5. Air Pollution Control Device Description:		- Underfeed Sto	okar Ot:	ner (specity)				
6. Stack Data: Height Above Ground 30 ft Gas Velocity ft/sec Inside Diameter 1.0 ft Temperature Est. Meisture 7 Location (UTM or Lat/Long) Sldg 1200  7. Emission Rate at rated capacity (lb/hr): Before After Control Control Method of Estimating Fillownt Device Device Emissions  Particulate Matter 707 100 AP 42 Dec 84  Soc AP 42 Dec 84  Other (specify:  8. Ar and it rich surjet to providing of the S.C. Matarious Waste Management Actions providing to be marged in this unit? (specify): 30  7. United Ap 42 Dec 84  Response of the S.C. Matarious Waste Management Actions providing to be marged in this unit? (specify): 30  7. United Ap 42 Dec 84  Response of the S.C. Matarious Waste Management Actions providing to be marged in this unit? (specify): 30		If flyash reinjection	on is to be use	d, give % rein	jection.			
6. Stack Data:  Height Above Ground 30 ft Gas Velocity ft/sec Inside Diameter 1.0 ft Temperature of St. Moisture 3 Location (UTM or Lat/Long) Sldg 1200  7. Emission Rate at rated capacity (15/hr):  Before After Control Method of Estimating Emissions  Particulate Matter 1007 1702 Ap 42 Dec 84  Soc Ap 42 Dec 84  Co 1048 Ap 42 Dec 84  Mig Other (specify):  8. Ar som at rich surjet to promisions of the S.C. Hazarlous Wast's Management Actions positions to be corner in this unit? (specify): MS  7. The interval and the second surjet in this unit? (specify): MS  7. The interval and second surjet in this unit? (specify): MS								
6. Stack Data:  Height Above Ground 30 ft Gas Velocity ft/sec Inside Diameter 1.0 ft Temperature OF Est. Moisture 3 Location (UTM or Lat/Long) Side 1999  7. Emission Rate at rated capacity (15/hr):  Before After Control Method of Estimating Emissions  Particulate Matter OF OF OF AP 42 Dec 84  Soc AP 42 Dec 84  Soc OF OF AP 42 Dec 84  Min Other (specify:  8. Ar som of richs surjet to providing of the S.C. Hazarlous Waste Management Actions providing to be ourselved this emit? (specify): MO  7. The objection of the surjet of the S.C. Hazarlous Waste Management Actions providing to be ourselved this emit? (specify): MO  7. The objective of the surjet of the S.C. Hazarlous Waste Management Actions providing to be ourselved to this emit? (specify): MO  7. The objective of the surjet of the S.C. Hazarlous Waste Management Actions of the S.C. Hazarlous Waste Managem	5	Air Zoliution Contro	nl Device Descr	ription: Hone	È			
6. Stack Data: Height Above Ground 30 ft Gas Velocity ft/sec Inside Diameter 1.5 ft Temperature OF Est. Moisture 2 Location (UTM or Lat/Long) S1dg 1200  7. Emission Rate at rated capacity (15/hr): Before After Control Method of Estimating Emissions  Particulate Matter COT 170 Apr 42 Dec 84  S0g Apr 42 Dec 84  C0 COT 170 Apr 42 Dec 84  No. COT	٠.		02 02 120 2 2 2 2 2					
Height Above Ground 30 ft Gas Velocity ft/sec Inside Diameter 1.0 ft Temperature OF Est. Moisture 36 Location (UTM or Lat/Long) Sidg 1999  7. Emission Race at rated capacity (15/hr):  Before After Control Method of Estimating Emissions  Particulate 2007 1 200 AP 42 Dec 84  CO AP 42 Dec 84  CO AP 42 Dec 84  CO AP 42 Dec 84  Other (specify:  8. Ar som at rates sinje t to providing of the S.C. Mazarlous Wast's Management Ast or a positions to be miraci in this unit? (specify): NC  7. The secondary seconds are single as a fine S.C. Mazarlous Wast's Management Ast or a positions to be miraci in this unit? (specify): NC  7. The secondary seconds are also as a fine S.C. Mazarlous Wast's Management Ast or a positions to be miraci in this unit? (specify): NC								
Height Above Ground 30 ft Gas Velocity ft/sec Inside Diameter 1.0 ft Temperature OF Est. Moisture 36 Location (UTM or Lat/Long) Side 1999  7. Emission Race at rated capacity (15/hr):  Before After Control Control Method of Estimating Emissions  Particulate Matter 2007 1 200 AP 42 Dec 84  CO OPEN 18 AP 42 Dec 84  CO OPEN 18 AP 42 Dec 84  Other Openify:  8. Ar and at rated separation to be mirror in this unit? (specify): NC  7. The second of the productions and the S.C. Hazardous Waste Management Act on a positions to be mirror in this unit? (specify): NC  7. The second of the production of the S.C. Hazardous Waste Management Act on a positions to be mirror in this unit? (specify): NC		<del></del>			•	and the second	~	
Inadia Diameter 1.5 ft Temperature OF Est. Moisture 2 Location (UTM or Lat/Long) Sidg 1999  7. Emission Race at rated capacity (15/hr):  Before After Control Method of Estimating Emissions  Particulate Matter 1007 1008 AP 42 Dec 84  Soc AP 42 Dec 84  CO OUBS OF AP 42 Dec 84  Other (specify):  8. Are and at rated sample to positions of the S.C. Hazarlous Wast's Management Act are positions to be marked in this unit? (specify): 30  7. Then the second Records a great and great are seen as week weeks very formulations and the second Records and seeks are seen as weeks and a great and great are seen as a great and great and great are seen as a great and great and great are seen as a great and great and great are seeks as a great and great and great are seeks as a great are seeks are seeks as a great are seeks are seeks as a great are seeks as a great are seeks are seeks as a great are seeks as a great are seeks are seeks as a great are seeks as a grea	,					gradient de la company de la c	*	
Est. Moisture	6.	Stack Data:	73 84 0	-		, , , , , , , , , , , , , , , , , , ,	*	
7. Emission Race at rated capacity (15/hr):  Before After Control Control Method of Estimating Emissions  Particulate Matter 207 1.776 AP 42 Dec 84  SO2 AP 42 Dec 84  CO AP 42 Dec 84  NO. AP 4	6.	Height Above Ground	GU EE GA	as Velocity			**	
Before Control Control Method of Estimating Emissions  Particulate Matter 007 1079 Ap 42 Dec 84  SOn 1048 19 Ap 42 Dec 84  SOn 1048 19 Ap 42 Dec 84  Other (specify):  Start and at making to be marked in this unit? (specify): 30  7. Nor at entiring knowled grows in this unit? (specify): 30  7. Nor at entiring knowled grows and dams week weeks/very to be a second or and second or	6.	Height Above Ground	ft Tempera	as VelocityoF	ft/sec		24. 	
Before Control Control Method of Estimating Emissions  Particulate Matter 007 1079 AP 42 Dec 84  SOn 1048 19 AP 42 Dec 84  CO 1048 19 AP 42 Dec 84  Other (specify):  S. Ar and at mile sinj. I to provide me S.C. Hazardous Wast's Management Art one provides to be murber in this unit? (specify): WS  7. Mar and at miles and to be murber in this unit? (specify): WS  7. Mar and at miles and a miles of the S.C. Hazardous Wast's Management Art one provides to be murber in this unit? (specify): WS	6.	Height Above Ground	ft Tempera	as VelocityoF	ft/sec			
Particulate Matter 1907 1906 Device Emissions  Particulate Matter 1907 1906 AP 42 Dec 84  SOc AP 42 Dec 84  CO 1946 19 AP 42 Dec 84  NO: Other (specify):  So are arm at rule sumplet to permutations of the S.C. Hazardous Wast's Management Act on a positional to be purpose in this unit? (specify): NO  7. Nor are senting knowled to be purpose in this unit? (specify): NO  7. Nor are senting knowled to be purposed in this unit? (specify): NO		Height Above Ground Inside Diameter 1.5 Est. Moisture	ft Tempera Location	as Velocity  ature OF  (UTM or Lat/Lor	ft/sec		*** ***	
Particulate Matter		Height Above Ground Inside Diameter 1.5 Est. Moisture	ft Tempera Location (	as Velocity  ature OF  (UTH or Lat/Lor	ft/sec		***	
Particulate Matter		Height Above Ground Inside Diameter 1.5 Est. Moisture	ft Tempera Location ( ted capacity () Before	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After	ft/sec ng)Sidq 12	200		
Particulate Matter		Height Above Ground Inside Diameter 1.5 Est. Moisture	ft Tempers Location  ted capacity ( Before  Control	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control	ft/sec ng) Sidg 12 Method	of Estimating	24. 27.	
AP 42 Dec 84  CO  NOW  NOW OTHER (specify):  Are anneated at last surject to productions of the S.C. Hazardous Wast's Management Actions productions to be marked in this unit? (specify):  7. Then the entities should see all the productions and days week weeks, we in the productions was an expectation.		Height Above Ground Inside Diameter 1.5 Est. Moisture 2	ft Tempers Location  ted capacity ( Before  Control	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control	ft/sec ng) Sidg 12 Method	of Estimating		
AP 42 Dec 84  AP 42 Dec 84  NOW AP 42 Dec 84  NOW AP 42 Dec 84  NOW AP 42 Dec 84  AP 4		Height Above Ground Inside Diameter 1.5 Est. Moisture 2	ft Tempers Location  ted capacity ( Before  Control	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control	ft/sec ng) Sidg !2 Method Em	of Estimating		
No. 100 to 100 t		Height Above Ground Inside Diameter 1.5 Est. Moisture 2011. Tare at raise 2011. Tant	ft Tempers Location  ted capacity ( Before Control Opevice.	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control	ft/sec  ag) Sidg 12  Method Em	of Estimating dissions		
Notice (specify):  8. Are anneated all surject to productions of the S.C. Hazardons Wast's Management Actions to be owners in this unit? (specify):  7. Then is a stating Secondary productions and days week weeks very management and the secondary control of the secondary was a secondary with the secondary was a secondary weeks.		Height Above Ground Inside Diameter 1.0 Est. Moisture 2 Emission Race at race Pullinant Particulate Matter	ft Tempers Location  ted capacity ( Before Control Opevice.	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control	ft/sec  ag) Sidg 12  Method Em	of Estimating dissions		
Other (spenify):  8. Are anneated all sumple to permissions of the S.C. Hazardons Wast's Management Asternal productions to be number in this unit? (specify): 35  7. Then is a string Secondary production of any week weeks/very		Height Above Ground Inside Diameter 1.0 Est. Moisture 2 Emission Race at race Pollocant Particulate Matter Son	ft Tempers Location  ted capacity () Before Control Device.	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control	ft/sec  ag) Sidg 12  Method Em  AP 42 De	of Estimating dissions		
3. Ar and it mills sumple to promisions of the S.C. Hazarlous Wast's Management Ast only providing to be mirror in this unit? (specify): "C  7. Normal entities to be mirror in this unit? days weekweeks/vein		Height Above Ground Inside Diameter 1.0 Est. Moisture 2 Emission Race at rac  Pollogant Particulate Matter SOn CO	Location ()  Location ()  Ed capacity ()  Before  Control  Device.	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control	Method Em  AP 42 09  AP 42 09	of Estimating dissions		
Antorno politicas to be current in this unit? (specify):		Height Above Ground Inside Diameter 1.0 Est. Moisture 2 Emission Race at rac  Pulliment Particulate Matter SOn CO NO.	Location ()  Location ()  Ed capacity ()  Before  Control  Device.	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control	Method Em  AP 42 09  AP 42 09	of Estimating dissions		
Action is positional to be number in this unit? (specify):		Height Above Ground Inside Diameter 1.0 Est. Moisture 2 Emission Race at rac  Pulliment Particulate Matter SOn CO NO.	Location ()  Location ()  Ed capacity ()  Before  Control  Device.	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control	Method Em  AP 42 09  AP 42 09	of Estimating dissions		
Action is positional to be number in this unit? (specify):		Height Above Ground Inside Diameter 1.0 Est. Moisture 2 Emission Race at rac  Pulliment Particulate Matter SOn CO NO.	Location ()  Location ()  Ed capacity ()  Before  Control  Device.	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control	Method Em  AP 42 09  AP 42 09	of Estimating dissions		
Antimate political to be mirror in this unit? (specify): MS  7. Then is a second secon		Height Above Ground Inside Diameter 1.0 Est. Moisture 2 Emission Race at rac  Pulliment Particulate Matter SOn CO NO.	Location ()  Location ()  Ed capacity ()  Before  Control  Device.	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control	Method Em  AP 42 09  AP 42 09	of Estimating dissions		
Action is positional to be number in this unit? (specify):	7.	Height Above Ground Inside Diameter 1.5 Est. Moisture 3 Emission Race at rac Pollocant Particulate Matter Son Co Non Other Capenday:	ft Tempers Location  ted capacity ( Before Control Device.	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control  Device	ft/sec ng)	of Estimating issions  25 84 26 84 26 84		
g. Normal of the state of the s	7.	Height Above Ground Inside Diameter 1.5 Est. Moisture 3 Emission Race at rac Pollocant Particulate Matter SOn CO NOn Other Ospensiye:	ft Tempers Location  ted capacity ( Before Control Device.  Out	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control  Device	ft/sec  Ag) Sidg 12  Method Em  AP 42 De  AP 42 De  AP 42 De	of Estimating dissions  15 94 15 84 15 84 15 14	·	
	7.	Height Above Ground Inside Diameter 1.5 Est. Moisture 3 Emission Race at rac Pollocant Particulate Matter SOn CO NOn Other Ospensiye:	ft Tempers Location  ted capacity ( Before Control Device.  Out	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control  Device	ft/sec  Ag) Sidg 12  Method Em  AP 42 De  AP 42 De  AP 42 De	of Estimating dissions  15 94 15 84 15 84 15 14		
	7.	Height Above Ground Inside Diameter 1.5 Est. Moisture 3 Emission Race at rac Pollocant Particulate Matter SOn CO NOn Other Ospensiye:	ft Tempers Location  ted capacity ( Before Control Device.  Out	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control  Device	ft/sec  Ag) Sidg 12  Method Em  AP 42 De  AP 42 De  AP 42 De	of Estimating dissions  15 94 15 84 15 84 15 14	it	
	7.	Height Above Ground Inside Diameter 1.5 Est. Moisture 3 Emission Race at rac Pollocant Particulate Matter SOn CO NOn Other Ospensiye:	ft Tempers Location  ted capacity ( Before Control Device.  Out	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):  After  Control  Device	ft/sec  Ag) Sidg 12  Method Em  AP 42 De  AP 42 De  AP 42 De	of Estimating dissions  15 94 15 84 15 84 15 14	it —	
	7.	Height Above Ground Inside Diameter 1.5 Est. Moisture 2 Emission Rate at rai  Pulliment Particulate Matter Son Co Non Other Capendiy:  Are above at rails a Act of a positional	ted capacity ()  Before Control Device.	as Velocity  ature OF  (UTM or Lat/Lon  lb/hr):  After  Control  Device	Method Em  AP 42 0e	of Estimating dissions of 84 of 84 of 84 of 84 of 84 of 84		
2). His will waste material from process and control equipment be disposed of?	₹.	Height Above Ground Inside Diameter 1.5 Est. Moisture 2 Emission Rate at rai  Pulliment Particulate Matter Son Co Non Other Capendiy:  Are above at rails a Act of a positional	ted capacity ()  Before Control Device.	as Velocity  ature OF  (UTM or Lat/Lon  lb/hr):  After  Control  Device	Method Em  AP 42 0e	of Estimating dissions of 84 of 84 of 84 of 84 of 84 of 84		
<ol> <li>Application was termaterial from process and control equipment be disposed of</li> </ol>	₹.	Height Above Ground Inside Diameter 1.5 Est. Moisture 2 Emission Rate at rai  Pulliment Particulate Matter Son Co Non Other Capendiy:  Are above at rails a Act of a positional	ted capacity ()  Before Control Device.	as Velocity  ature OF  (UTM or Lat/Lon  lb/hr):  After  Control  Device	Method Em  AP 42 0e	of Estimating dissions of 84 of 84 of 84 of 84 of 84 of 84		
4.6.2.4	7.	Height Above Ground Inside Diameter 1.5 Est. Moisture 3 Emission Rate at rai  Pollocant  Particulate Matter Sog Co No., Other Capendiy:  Are above at riols at Act who policing	ft Tempers Location  ted capacity (  Before Control Device.  (()) (()) (()) (()) (()) (()) (()) (	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):     After    Control    Device  :	Method Em  AP 42 De  AP 42 De	of Estimating dissions  2 84 2 84 2 84 3 74  US Wast's Management (C)		
.17.	7.	Height Above Ground Inside Diameter 1.5 Est. Moisture 3 Emission Rate at rai  Pollocant  Particulate Matter Sog Co No., Other Capendiy:  Are above at riols at Act who policing	ft Tempers Location  ted capacity (  Before Control Device.  (()) (()) (()) (()) (()) (()) (()) (	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):     After    Control    Device  :	Method Em  AP 42 De  AP 42 De	of Estimating dissions  2 84 2 84 2 84 3 74  US Wast's Management (C)		
	7.	Height Above Ground Inside Diameter 1.5 Est. Moisture 3 Emission Rate at rai  Pollocant  Particulate Matter Sog Co No., Other Capendiy:  Are above at riols at Act who policing	ft Tempers Location  ted capacity (  Before Control Device.  (()) (()) (()) (()) (()) (()) (()) (	as Velocity  ature OF  (UTM or Lat/Lor  lb/hr):     After    Control    Device  :	Method Em  AP 42 De  AP 42 De	of Estimating dissions  2 84 2 84 2 84 3 74  US Wast's Management (C)		

BUREAU USE
Patrut No.:

ID. No.:
Data:
Reviewed By:

1.	Company Name: SHAW	AFB			Date: 20 Apr 8
	Type of Fuel Burning Unit Designation:	Operation:	Steam Bolla	r Heating	
2.	Make: <b>Kewanee</b> Capacity: Ratel Inpu	,	Model:		
	Capacity: Rate: Inpu	t 2.05 x 10	00 BTU/hr R.	ated Output	x 10° BTU/hr
	x	103 lbs of st	.eam ar a	r and	
3.	Fuel Data (indicate a	ll units):			
	<b>.</b> .		<i>a</i> ,	<i>a</i>	
	Fuel Type and Grade	Content	% Sulrar	% Ash	Consumption 3 rated capacity
	Natural Gas 10	35 3TU/Ft3		uy wergit	1931 F37/FR
	#2 011 140	0.000 ST'1/3al			14-5 Par 1-P
	Surnar Tuna /calii fu	11 - 001 W	Dulmaniaa	: mwa.,	olina Crita
	Burner Type (solid fu Underfeel Stok	ers only. er Oth	rdivertion ar (specify)		elling blace
	Underfeed Stok If flyash reinjection	is to be used	d, give % rei	njection.	
· .	Air Pollution Control	Device Descr	iption:	•	
	Height Above Ground Inside Diameter 1.0 Est. Moisture 3 Cmission Rate at race	i capacity (1 Before	b/hr]: After		
		Control	Control		of Estimating
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# SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL BUREAU OF AIR QUALITY CONTROL FUEL BURNING PERMIT APPLICATION

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ID. No.:
Datz:

Reviewed By:

		PART			Review
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	Type of Fuel Burning ( Unit Designation: 810	do 1206 Heatir	ream Borrer H	eacing	
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<u>2</u>	Make: York Shipley -Capacity: Rated Inpu	t 1.05 × 10 <sup>t</sup>	BTU/hr -Rat	ted Output	x 100 BTU/hr
	x	103 lbs of ste	eam/hr d	OF and	PSIG
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# SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL BUREAU OF AIR QUALITY CONTROL FUEL BURNING PERMIT APPLICATION

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Date:

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مأر پوسیدن دارس	Company Name: Type of Fuel Burnis	SHAW AFB			Date: 20 Apr 30
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	Type and Grade	Content	by weight	by weight	3 rated capacity
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### SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL BUREAU OF AIR QUALITY CONTROL FUEL BURNING PERMIT APPLICATION

Permet No.:

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Reviewed By:

## PART IIA

1.	Company Name:	SHAW AFB			Date: 27 Apr 88
	Type of Fuel Burn	ning Operation: H	lot Water Soi	ler Heating	
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# SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL BUREAU OF AIR QUALITY CONTROL FUEL BURNING PERMIT APPLICATION

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# APPENDIX C State Regulations

#### SOUTH CAROLINA AIR POLLUTION CONTROL REGULATIONS

(South Carolina Department of Health and Environmental Control; Regulation 61-62 — Air Pollution Control Regulations and Standards; Adopted July 26, 1972; As amended through May 28, 1981; December 16, 1982; April 22, 1983; June 24, 1983; May 24, 1985; May 23, 1986)

#### CONTENTS

Regulation No. 62 1 - Air Pollution Control

Regulation No. 62.2 — Prohibition of Open Burning

Regulation No. 62.3 — Air Pollution Episodes

Regulation No. 62.4 — Hazardous Air Pollution Conditions

Regulation No. 62.5 — Air Pollution Control Standards [See page 506.1001]

Regulation No. 62.6 — Control of Fugitive Particulate Matter

Regulation No. 627 — Good Engineering Practice Stack Height

# REGULATION NO. 62.1 AIR POLLUTION CONTROL

#### Section 1 — Definitions

The following words and phrases when used in the Regulations and Standards shall for the purpose of these regulations have the meanings respectively ascribed to them in this section, unless a different meaning is clearly indicated. This section augments Section 1 of the South Carolina Pollution Control Act.

- 1. Acid Mist Mist or droplets of sulfuric or other strong acids. Sulfuric acid mist includes sulfur trioxide (SO.) and sulfuric acid vapor as well as liquid mist.
- 2. Add Additions to a process which will increase size, scope or emissions from such process.
- 3. Alter Alter means modification or change in a process or processes which would affect emissions to the atmosphere
- 4 Ambient Air Quality Standards That standard for the quality of ambient air at or beyond a property line on which a source of pollution is emitting.

- 5. Application Means a form provided by the Department which is prescribed to provide the information required to grant approval to construct and operate a source or an incinerator; or to report an existing information.
- 6. Board Board means Board of Health and Environmental Control.
- 7. Commissioner Commissioner means the Commissioner of the Department of Health and Environmental Control.
- 8. Department Department means the Department of Health and Environmental Control.
- 9. Emission Data The definition contained in 40 CFR 2.301(a)(2), July 1, 1982, is incorporated by reference.
- 10. Emission Limitation (and emission standard) A requirement established by the State or by the Administrator of the Environmental Protection Agency which limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis, including any requirements which limit the level of opacity, prescribe equipment, set fuel specifications, or prescribe operation or maintenance procedures for a source to assure continuous emission reduction.
- 11. Fuel Burning Operation Use of furnace, boiler, device or mechanism used principally but not exclusively, to burn any fuel for the purpose of indirect heating in which the material being heated is not contacted by and adds no substance to the products of combustion.
- 12. Fugitive Dust A type of particulate emission that becomes airborne by forces of wind, man's activity or both, including but not limited to, construction sites, tilled land, materials storage piles, and materials handling
- 13. Fugitive Emissions Air contaminants which escape to the air not through an exhaust system, but

through other means, including but not limited to, windows, vents, doors, ill-fitting closures or poorly maintained equipment

- 14 Garbage Animal and vegetable waste resulting from the handling, preparation, cooking and serving of foods.
- 15. Hazardous Air Pollutant A pollutant which is the subject of National Emission Standards for Hazardous Air Pollutants promulgated by the United States Environmental Protection Agency by publication in the Federa! Register
- 16 Incinerator An engineered apparatus and all appurtenances thereto, designed to reduce combustible solid, semi-solid, liquid, or gaseous waste by high temperature burning
- 17 "Krast pulp mill" Any stationary source which produces pulp from wood by cooking (digesting) wood chips in a water solution of sodium hydroxide and sodium sulfide (white liquor) at a high temperature and pressure Regeneration of the cooking chemicals through a recovery process is also considered part of the krast pulp mill
- 18 Major Plant Except as otherwise provided, this term refers to any plant which directly emits, or has the potential to emit, one hundred tons per year or more of any regulated air pollutant.
- 19 Mass Emission Rate The weight discharged per unit of time.
- 20. Opacity The degree to which emissions reduce the transmission of light and obscure the view of an object in the background.
- 21. Open Burning —Any fire or smoke-producing process which is not conducted in any boiler plant, furnace, high-temperature processing unit, incinerator of flare, or in any other such equipment primarily designed for the combustion of fuel or waste material
- 22. Particulate Matter Any material, except uncombined water, that exists in a finely divided form as a liquid or solid at standard conditions.
- 23 Plant Except as otherwise provided, any stationary source or combination of stationary sources, which is located on one or more contiguous or adjacent properties and owned or operated by the same person(s) under common control
- 24 Potential to Emit The maximum capacity of a plant to emit a regulated pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the plant to emit a regulated pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed.

shall be treated as part of its design only if the limitation or the effect it would have on emissions is federally enforceable. Secondary emissions do not count in determining the potential to emit of a plant.

- 25. Process Industry Any source engaged in the manufacture, processing, handling, treatment, forming, storing or any other action upon materials except fuel-burning operations
- 26. Process Weight The total weight of all materials introduced into a source operation, including air and water where these materials become an integral part of the product, and solids used as fuels but excluding liquids and gases used solely as fuels.
- 27. Process Weight Rate A rate established as follows:
- (a) For continuous or long-run steady-state source operations, the total process weight for the entire period of continuous operation or for a typical portion thereof, divided by the number of hours of such period or portion thereof.
- (b) For cyclical or batch unit operations, or unit processes, the total process weight for a period that covers a complete operation or an integral number of cycles, divided by the hours of actual process operation during such a period

Where the nature of any process or operation or the design of an equipment is such as to permit more than one interpretation of this definition, the interpretation that results in the minimum value for allowable emission shall apply.

- 28. Refuse Garbage, rubbish and/or trade waste.
- 29. Rubbish Solid wastes from residences and dwellings, commercial establishments, and institutions.
- 30. Salvage Operations Any operation of a business, trade, or industry engaged in whole or in part in salvaging or reclaiming any product or material, including, but not limited to, metals, chemicals, shipping containers, drums or automobiles
- 31. Secondary Emissions Emissions which would occur as a result of the construction or operation of a major plant or major modification, but do not come from the major plant or major modification itself. Secondary emissions must be specific, well defined, quantifiable, and must impact the same general area as the plant or modification which causes the secondary emissions. Secondary emissions may include, but are not limited to:
- (a) emissions from ships or trains moving to or from the new or modified plant.
- (b) emissions from any offsite support facility operation which would not otherwise be constructed or increase its emissions as a result of the construction or operation of the major plant or major modification

- 32. Smoke Small gas-borne and airborne particles arising from a process of combustion in sufficient number to be observable by a person of normal vision under normal conditions.
- 33 Solid Fuel A fuel which is fired as a solid such as coal, lignite and wood.
- 34. Stack Any flue, conduit, duct, chimney, or opening arranged to conduct an effluent into the open air.
- 35. Stack Height The vertical distance measured in feet between the point of discharge from the stack or chimney into the outdoor atmosphere and the elevation of the land thereunder.
- 36. Standard Conditions 760 millimeters of mercury at 25 degrees Centigrade.
- 37 Stationary Source Any building, structure, installation or process which emits or may emit an air pollutant subject to regulation by any national or state standard. Use of the term "source" is to be construed to mean "stationary source."
- 38 "Total reduced sulfur (TRS)" means the sum of the sulfur compounds hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide, that are released during the kraft pulping operation and measured by Federal Reference Method 16.
- 39. Trade Waste All solid, liquid, or gaseous material or rubbish resulting from construction, building operations, or the prosecution of any business, trade or industry including, but not limited to, plastic products, cartons, paint, grease, oil and other petroleum products, chemicals and cinders.
- 40 Volatile Organic Compound (VOC) any chemical compound containing carbon which has a vapor pressure greater than one-tenth (0.1) mmHg at standard conditions excluding:
  - 1 methane
  - 2. ethane
  - 3 1.1.1-trichloroethane (methyl chloroform)
  - 4 benzene
  - 5 acetonitrile
  - 6 chloroform
  - 7. carbon tetrachloride
  - 8. ethylene dichloride
  - 9 ethylene dibromide
  - 10. methylene chloride
  - 11 trichlorofluoromethane (CFC-11)
  - 12 dichlorodifluoromethane (CFC-12)
  - 13 chlorodifluoromethane (CFC-22)
  - 14 trifluoromethane (FC-23)
  - 15 trichlorotrifluoroethane (CFR-113)
  - 16 dichlorotetrafluoroethane (CFC-114)
  - 17 chloropentafluoroethane (CFC-15)
  - 18 carbon monoxide
  - 19 carbon dioxide

- 20 carbonic acid
- 21. ammonium carbonate
- 22 metallic carbides or carbonates

#### **SECTION 11 - PERMIT REQUIREMENTS**

- A. Construction Permit
- 1. Applicability

Any person who plans to construct, alter or add to a source of air contaminants, including installation of any device for the control of air contaminant discharges, shall first obtain a construction permit from the Department. The Department may grant permission to proceed with minor alterations or additions without issuance of a permit when the Department determines that the alteration or addition will not increase the quantity and will not alter the character of the source's emissions

2. Permit Application

Construction permit applications shall be reviewed and signed by a professional engineer registered to practice in the State of South Carolina and shall provide, as a minimum, the following information.

- a. The name and location of the plant and its planned operating schedules:
- b Sufficient description including physical and chemical properties of materials and processes necessary for the Department to determine actual and potential emissions;
  - c Identification of all emission points;
- d. A description, including physical and chemical properties of all emissions.
- e. A complete description including engineering design and operating characteristics of any air pollution control device or system that is to be installed; and
- f. Source information and calculations to demonstrate compliance with "Good Engineering Practice Stack Height" rules; and
- g Other information as may be necessary for proper evaluation of the proposed source as determined by the Department

Package-type incinerators of 750 pounds, hr rated capacity or smaller which burn types 0 and 1 wastes as defined by the Incinerator Institute of America and package-type boilers of 100 × 10° BTU/hr input capacity or smaller which burn natural gas or oil as fuel are exempt from the requirement that the construction permit applications be prepared and submitted by a registered professional engineer provided the proposed unit is identical to a proto-type model which has been previously designed or otherwise certified by a professional engineer.

- B Operating Permit
- 1 Original

A written request to obtain an operating permit shall be submitted to the Department no later than fifteen (15) days prior to placing any new, increased or altered source into operation.

#### 2 Renewal

Prior to the expiration date of a source's operating permit, the source will be inspected by the Department in order to decide whether to renew the permit Times record of compliance and future probability of compliance will be given appropriate weight in making the decision regarding renewal

Any special condition in a permit should be verified during the inspection and specifically mentioned in the report. Any additional provisions that the inspector believes warrants inclusion in the renewed permit are to be clearly and concisely stated in the inspection report.

C Standard Permit Conditions

All permits shall contain, in addition to such special conditions as the Department finds appropriate, the following standard conditions

- 1 No applicable law, regulation or standard will be contravened
- 2 All official correspondence, plans, permit applications and written statements are an integral part of the permit
- 3 For sources not required to have continuous emission monitors, any malfunction of air pollution control equipment or system, process upset or other equipment failure which results in discharges of air contaminants lasting for one hour or more and which are greater than those discharges described for normal operation in the permit application shall be reported to the Department within twenty-four hours after the beginning of the occurrence and a written report submitted to the Department within thirty (30) days. The written report shall include as a minimum, the following:
- a The identity of the stack and/or emission point where the excess emissions occurred.
- b The magnitude of the excess emissions expressed in the units of the applicable emission limitation and the operating data and calculations used in determining the excess emissions
  - c. The time and duration of the excess emissions
- d. The identity of the equipment causing the excess emissions.
  - e. The nature and cause of such excess emissions.
- f. The steps taken to remedy the malfunction and the steps taken or planned to prevent the recurrence of such malfunction.
  - g. The steps taken to limit the excess emissions.
- h. Documentation that the air pollution control equipment process equipment, or processes were at all times maintained and operated, to the maximum extent practi-

cable, in a manner consistent with good practice for minimizing emissions

4. Sources required to have continuous emission monitors will make quarterly reports as specified in applicable parts of the Regulations

D. Exceptions

- 1. Upon request, the Department may alter operating permits, compliance schedules, or other restrictions on operation of a source provided that resulting ambient air concentration levels will not exceed any national or state ambient air quality standard. Factors to be considered by the Department may include, but are not limited to, technology, economics, national energy policy, and existing air quality. The request by the source must also show the following
- a Good faith efforts have been made to comply with the state requirements.
- b The source is unable to comply with the state requirements because the necessary technology or other alternative methods of control are not reasonably available, or have not been available for a sufficient period of time
- c Any available operating procedures, or control measures, reducing the impact of the source on ambient air concentrations, have been implemented
  - d. The request is submitted in a timely manner.
- 2. The provisions of this paragraph shall not apply to mass emission limits which are imposed upon any source by the following requirements
  - a. Federal New Source Performance Standards;
- b. National Emission Standards for Hazardous Air Pollutants;
- c. Federal or State Prevention of Significant Deterioration Regulations; or,
  - d. Non-attainment requirements.
- 3. Where a permanent increase in the visible emission limitation for a source is requested, the source must demonstrate that it will remain in compliance with the applicable particular emission standard
- 4 Any alternative compliance schedule shall provide for compliance with the applicable regulations as expeditiously as practicable; based on a plan submitted with the request for the alternative compliance schedule.
- 5. Any request under this section will be subjected to public notice and opportunity for a public hearing. Upon approval by the Board, the recommendations of this Department shall be sent to the Administrator of the Environmental Protection Agency, or his designated representative, for approval or disapproval.
- 6. Where alternative compliance schedule provisions are contained elsewhere in the air pollution control regulations, those provisions shall supersede the requirements in this section.

E. Transfer of Ownership/Operation

Whenever the ownership/operation of a source has been transferred, the Bureau shall be notified by the new owner/operator within thirty (30) days of the transaction. A transfer of the operation or construction permit will be effective upon written approval by the Department

- F. Exemptions
- 1. No permits shall be required for the following sources constructed prior to February 11, 1971:
  - a. Natural gas boilers.
- b Oil-fired boilers of 50 × 10° BTU/HR rated input capacity or smaller.
- c. Coal-fired boilers of  $20 \times 10^{\circ}$  BTU/HR rated input capacity or smaller
- 2. No permits shall be required for the following sources:
- a Boilers and space heaters of less than  $1.5 \times 10^{\circ}$  BTU HR rated input capacity.
  - b. Comfort air-conditioning or ventilation systems.
  - c Motor vehicles.
  - d Laboratory hoods.
- e Emergency power generators of less than 150 KW rated capacity.
- f Sources emitting only steam, air, nitrogen, oxygen, carbon dioxide, or any physical combination of these.
- g Sources with an uncontrolled particulate emission rate of less than 1 lb/hr and/or uncontrolled VOC emission rate of less than 1000 lbs/mo. may not require permits. However, source information needs to be submitted to the Department and a determination on the need for permits will be made. This determination will take into consideration, but will not be limited to, the nature and amount of the pollutants, location, proximity to residences and commercial establishments, etc.
- h Sources whose only emissions are fugitive must submit source information, and the need for permit(s) will be made by the Department on a case by case basis. This determination will take into consideration, but will not be limited to, the nature and amount of the pollutants, location, proximity to residences and commercial establishments, etc.

#### SECTION III — EMISSIONS INVENTORY

Emissions inventory is a study or compilation of pollutant emissions. Emissions inventories are designed to locate air pollution sources, to define the type and size of sources, to define the type and amount of emissions from each source, to determine pollutant frequency and duration, to determine the relative contributions to air pollution problems of classes of sources and of individual sources and to determine the adequacy of regulations and standards.

The emissions inventory for all major plants will be reviewed annually. Information required for this re-ew will include, but is not limited to, the following.

- A Information on fuel burning equipment:
- B. Types and quantities of fuel used;
- C Fuel analysis;
- D Exhaust parameters;
- F Raw process materials and quantities used.
- G. Design and normal process rates;
- H Hours of operation;
- 1. Significant emission generating points or processes
- J. Any desired information listed in 40 CFR 51, Appendix E (July 1, 1982).

Every even calendar year a new updated emission inventory will be completed by the plant. All applicable information will be recorded on the current form for reporting emission data.

In the intervening calendar years, any charge in emission data will be recorded on the annual compliance inspection report.

The above requirements notwithstanding, an emission inventory may be required at any time in order to determine the compliance status of any plant

#### **REGULATION NO. 62.2**

#### PROHIBITION OF OPEN BURNING

Open burning is prohibited except as provided beat-

- A. Open burning of leaves, tree branches or yard trainings originating on the premises of private residences and burned on those premises.
- B. Open burning in connection with the preparation of food for immediate consumption.
- C Campfires and fires used solely for recreational turposes, ceremonial occasions, or human warmth.
- D. Fires purposely set to forest lands for specific firest management purposes in accordance with practices acceptable to the Department and as administered by the South Carolina Forestry Commission. Such management practices shall include.
- Prescribed burning under existing standards of various management objectives, and
- 2 Site preparation burning for purposes of clearing an area for regeneration.
- E Fires purposely set for agricultural control of the eases, weeds, pests and other specific agricultural poses in accordance with practices acceptable to the Department of Health and Environmental Control.
- F. Open burning of trees, brush, grass and other vegetable matter for game management purposes in accordance with practices acceptable to the Department of Health and Environmental Control.

#### SOUTH CAROLINA AMBIENT AIR OUALITY STANDARDS

(South Carolina Department of Health and Environmental Control; Regulation 61-62.5 — Air Pollution Control Standards; As last amended April 25, 1984; May 24, 1985; January 23, 1986)

#### CONTENTS

Standard No. 1 - Emissions from Fuel Burning Operations

Standard No. 2 - Ambient Air Quality Standards

Standard No. 3 — Emissions from Incinerators

Standard No. 4 — Emissions from Process Industries

Standard No. 5 - Volatile Organic Compounds

**REGULATION NO. 62.5** AIR POLLUTION CONTROL STAN-

STANDARD No. 1 EMISSIONS FROM FUEL BURNING **OPERATIONS** 

SECTION I — VISIBLE EMISSIONS

#### A. Existing Sources

No one shall discharge to the ambient air from any existing source constructed prior to February 11, 1971, smoke which exceeds an opacity of forty (40) percent. For a total of six (6) minutes in one hour or twenty-four (24) minutes in a twenty-four (24) hour period, forty (40) percent opacity

may be exceeded for soot blowing; but SECTION II - PARTICULATE shall in no case exceed an opacity of sixty (60) percent.

#### **B. New Sources**

No one shall discharge to the ambient air from any source constructed on or after February 11, 1971, smoke which exceeds an opacity of twenty (20) percent. For a total of six (6) minutes in one hour or twenty-four (24) minutes in a twenty-four (24) hour period, twenty (20) percent opacity may be exceeded for soot blowing; but shall in no case exceed an opacity of sixty (60) percent.

#### C. Special Provisions

The opacity standards set forth above do not apply during startup or shutdown. Owners and operators shall, to the extent practicable, maintain and operate any source including associated air pollution control equipment in a manner consistent with good air pollution control practices for minimizing emissions. In addition, the owner or operator shall maintain a log of the time, magnitude, duration and any other pertinent information to determine periods of startup and shutdown and make available to the Department upon request.

# **EMISSIONS**

#### A. Allowable Discharge

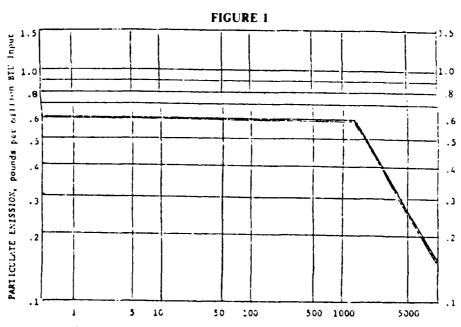
The allowable discharge of particulate matter resulting from fuel burning operations shall be limited to the values obtained by use of Figure 1 and/or Part B. (For the purpose of determining heat input, total equipment capacity refers to total equipment capacity discharging through each stack. If a boiler has more than one (1) stack the total rated capacity will be the boiler rated capacity discharging to these stacks). Interpolation of Figure 1 for fuel burning operations of 1300 million BTU per hour heat input and larger shall be accomplished by use of the equation:

#### $E = 57.84 P^{-0.63}$

where E = the allowable emission rate in pounds per million BTU heat input, and P = million BTU heat input per hour

#### **B. Special Provisions**

All fuel burning operations of 10 million BTU per hour heat input and smaller constructed prior to February 11, 1971 shall be allowed 0.8 pounds per million BTU in-



TOTAL EQUIPMENT CAPACITY RATING (FUEL INPUT ONLY) MILLION BTU PER HOUR INPUT

# SECTION III — SULFUR DIOXIDE FMISSIONS

#### A. General

The maximum allowable discharge of sulfur dioxide (SO.) from fuel burning operations shall be in accordance with a system of priorities as specified hereinafter in paragraph B. The classifications shall be delineated on a county basis. The maximum allowable discharge for the various classes is specified in paragraph C of this Section.

#### B. Classifications

I The class into which a given county falls has been determined by mathematical atmospheric diffusion models and other methods which evaluate those factors which necessitate limits on sulfur dioxide emissions. These factors included but were not limited to. (1) total sulfur dioxide emissions. (2) spatial distribution of sulfur dioxide sources. (3) effects of single, large sources. (4) existing, measured air quality; (5) topographical features of the county; (6) contributions to background levels due to sources outside the county being considered. (7) population density.

2 The assigned classifications will be reviewed periodically at intervals not to exceed three years, and changes will be made as required. When a county is assigned to a more restrictive class, individual compliance schedules will be established in such a way that reasonable time will be allowed for the source to make necessary changes in equipment and/or fuel contracts.

tracts

3 The following classifications are assigned

Class I — Charleston County

Class II — Aiken County — Anderson County

Class III - All others

#### C. Allowable Discharges

Sulfur dioxide emissions from fuel burning sources located in various counties will not exceed the following limits:

#### 1. Counties in Class 1

Rated Source Size (ib SO; million	
I p to and including 10 million BTU. I Greater than 10 million BTU nr	or 3.5
Lincountries in Consolin	
	wahle Emissions from BTU Inputs
Cp (- 1000) ; (cf)	3.3
1000 million 61 in rain and an extra	2.3

3. Counties in Class Illi

Rated Source Size Maximum Allowable Emissions (IbSO, million BTU Inputs 3.5)

#### D. Special Provisions

If it can be demonstrated to the satisfaction of the Board that ambient air standards will not be contravened by a source, alone or in combination with other sources, a greater allowance for sulfur dioxide discharges may be made on a case by case basis.

#### SECTION IV — OPACITY MONITOR-ING REQUIREMENTS

#### A. Applicable Sources

- 1. Fossil Fuel Fired Boilers. The owner or operator of any fossil fuel-fired steam generator of more than 250 million BTU per hour heat input capacity shall install, calibrate, operate, and maintain no later than June 14, 1978, continuous monitoring system(s) for the measurement of opacity which meets the performance specifications of Paragraph D of this Section except where:
  - a. Gaseous fuel is the only fuel burned,
- b. Oil or a mixture of gas and oil are the only fuels burned and the steam generator is able to comply with the provisions of Sections I and II of this Standard without utilization of particulate matter collection equipment, and where the steam generator has never been found, through any administrative or judicial proceedings, to be in violation of Section I of this Standard.
- c. The steam generator operates with an annual average capacity factor of 30 percent or less, as reported to the Federal Power Commission for calendar year 1974 or otherwise adequately demonstrated to the Department; and has not subsequently increased this factor to more than 30 percent
- 2. Woodwaste Boilers The owner or operator of any woodwaste boiler, not equipped with a wet scrubber, will be required to install, calibrate, operate and maintain continuous monitoring system(s) approved by this Department for the measurement of opacity, if it meets one or more of the following criteria
- a. Any woodwaste boiler of at least 60,000 lb steam/hr rated output
- b. Any woodwaste boiler, regardless of size, that has been operating in non-com-

pliance with any applicable state air pollution control regulations and standards

If a boiler is fired on more than one fuel, the total capacity will determine the applicability of above requirements

# B. Continuous Opacity Monitor Reporting Requirements

The owner or operator of any fossil fuel-fired steam generator subject to the provisions of Paragraph A of this Section shall submit a written continuous Opacity Monitor report to the Department at least quarterly, or more often if requested. All quarterly reports must be postmarked by the 30th day following the end of each calendar quarter.

The report shall include the following minimum information:

- a All integrated six minute opacity measurements for periods during which the applicable provisions of Section I have been exceeded, together with their nature and cause.
- b For periods of monitoring system multunetion
- (1) The date and time identifying each period during which the monitoring system was inoperative, except for zero and span checks.
- (ii) The nature of monitoring system repairs or adjustments.
- (iii) Proof of opacity monitoring system performance may be required by the Department whenever repairs or adjustments have been made.
- c. boiler system repairs or adjustments made to correct violations of the provisions of Section 1.

If no reportable incidents occur during a quarter, a report is also required indicating as such.

- 2 Alternative data reporting procedures may be allowed if the owner or operator shows, to the satisfaction of the Department, that these procedures are at least as accurate as those described.
- 3. The owner or operator shall maintain a file of all information contained in the quarterly reports, calibration data for the opacity monitoring system(s), relevant records of adjustments and maintenance performed on such system(s), and all other data generated by the continuous opacity monitoring system(s), for a minimum of two years from the date of submission of such reports or collection of such data

The information contained on file must be made available for review by Department personnel upon request

# C. Exemption from Reporting Requirements

A temporary exemption from the opacity monitoring and reporting requirements of this Section may be granted during any period of monitoring system(s) malfunction, provided the owner or operator shows, to the satisfaction of the Department, that the malfunction was unavoidable and is being repaired as expeditiously as possible

#### D. Equipment Performance Specifications

The continuous opacity monitoring system(s) required by Paragraph A.1 of this Section for fossil fuel fired steam generators shall conform with the performance specifications set forth in 40 CFR, part 60, Appendix B, Performance Specification 1 which is incorporated by reference as a part of this Standard except that where the term "Administrator" is used the term "Department" shall be substituted. In addition, the opacity monitoring system(s) shall complete a minimum of one cycle of operation for each successive 10-second period; be installed such that representative measurements of opacity from the affected steam generator are obtained; and have an instrument span of approximately 80 percent opacity

The owner or operator shall record the zero and span drift in accordance with the method prescribed by the manufacturer of such onacity monitoring system(s); subject the system(s) to the manufacturer's recommended zero and span check at least once daily unless the manufacturer has recommended adjustments at shorter intervals, in which case such recommendations shall be followed; adjust the zero and span whenever the 24-hour zero drift or 24-hour calibration drift limits of 40 CFR. Part 60, Appendix B. Performance Specification 1 are exceeded; adjust the opacity monitoring system(s) purchased prior to September 11, 1974 whenever the 24-hour zero drift or 24-hour calibration drift exceeds 4 percent opacity for those generators constructed prior to February II. 1971 and 2 percent opacity for those generators constructed after February 11 1971

The monitoring systems must be approved by this agency prior to installation

#### E. Monitor Location

When the effluents from two or more affected steam generators of similar design and operating characteristics are combined before being released to the atmosphere, the opacity monitoring system(s) shall be installed on the combined effluent. When the affected steam generators are not of similar design and operating characteristics, or when the effluent from one affected steam generator is released to the atmosphere through more than one point, the owner or operator shall apply for an alternate procedure to comply with the requirements of this Section.

# F. Exemptions from Monitoring Requirements

Whenever the requirements for continuous opacity monitoring cannot be implemented by the owner or operator due to physical plant limitations, extreme economic burden, or infrequent steam generator operation of less than 30 days per year, or when the specified monitoring procedure would not provide accurate opacity determinations, alternate monitoring and reporting requirements may be aproved on a case-by-case basis provided the owner or operator submits a written request to the Department which includes, but not limited to

- 1 The basis of reason(s) that alternate requirements are necessary:
- 2 A proposal of the alternate monitoring and reporting requirements, and
- 3 Any other information needed by the Department to make a determination that the alternate requirements are adequate to meet the intent of this Section

#### SECTION V = EXEMPTIONS

The following sources shall be exempt from the provisions of this standard.

- A Residences of four families or less.
- B Ocean-going vessels actually engaged in the physical process of national or international trade or defense.

#### SECTION VI — PERIODIC TESTING

Scheduled periodic tests for particulates will be required of the sources listed below every two years, or as required by permit conditions to demonstrate compliance with this Standard. Compliance with sulfur dioxide will be by source testing, continuous monitoring, or fuel analysis as required by the permit conditions.

A. Oil-fired boilers greater than 250 > 10° BTV throrated input

- B Coal-fired boilers greater than 50 > 10' BTU/hr rated input
- C. Woodwaste, or combination woodwaste boilers greater than  $20 \times 10^\circ$  BTU/hr rated input

# SECTION VII – SOURCE TEST REQUIREMENTS

A. The owner or operator required to comply with Section VI above shall conduct such tests as required by the Department in order to demonstrate compliance with this Standard EPA test methods or such alternative methods as approved by the Department prior to testing

Tests shall be conducted while the source is operating at the expected maximum production rate or other production rate or operating conditions which would result in the highest emissions. Any production rate less than rated capacity may result in production limitations on the permits.

All tests shall be made by, or under the direction of, a person qualified by training and/or experience in the field of air pollution testing

B Any source owner or operator proposing to conduct tests in accordance with paragraph A, above shall notify the Department in the manner set forth below of the intent to test, not less than two weks before the proposed initiation of the tests so the Department may observe the test if it desires to do so

Notification shall include the following minimum information:

- 1 the purpose of the proposed test.
- 2. a description of the source to be tested.
- 3 a description of the test procedures, equipment, and sampling sites
- 4. a timetable, setting forth the dates on which the testing will be started and concluded
- C. The final test results must be submitted no later than 30 days after completion of the on-site testing, containing as a minimum, the following
  - 1 process weight rates (lb/hr)
- 2. process design and load rates at which the test was conducted
- 3 procedure used for determining process weight rates
- 4 calculations usded to determine process weight rates
- 5 signature of responsible company official

- D. The owner or operator proposing a source test under the provisions of this section shall be responsible for providing
- l. sampling ports, pipes, lines, or appurtenances for the collection of samples and data required by the test procedure
- 2 safe access to the sample and data collection locations
- 3 light, electricity, and other utilities required for sample and data collection
- E Any proposed deviations from the procedures and requirements stated above must be thoroughly explained and mut be approved by this Department prior to testing. Failure to observe any of these proce-

dures or requirements may be grounds for not accepting the tests

#### STANDARD NO. 2 AMBIENT AIR QUALITY STAN-DARDS

The following table constitutes the ambient air quality standards for the State of South Carolina. The analytical methods to be used will be those applicable Federal Reference Methods published in 40 CFR 51, Appendices A-F. In the case of fluorides either the double paper tape sampler methods (ASTMD-3266-73T) or the sodium bicarbonate-coated glass tube and particulate filter methods (ASTM-3268-73T) may be used.

minutes in any one hour or twenty-four (24) minutes in a twenty-four hour period

- C. Odors from the incinerator shall be reduced to such a level as not to create an undesirable level
- D. Emissions shall not contain individual particles which are sufficiently large as to be visible as individual particles at the emission point or are of such size and nature as to be visible individually as incandescent particles. This requirement shall only apply if particles fall on real property other than that of the person responsible for the emission.

#### STANDARD NO. 4 EMISSIONS FROM PROCESS IN-DUSTRIES

#### SECTION 1 — GENERAL

A. The method which is approved by the Department for determining, compliance with opacity limitations under this Standard is EPA Reference Method 9 (40 CFR 60, Appendix A, as revised July 1, 1984). Alternate methods may be utilized only if approved in advance by the Department and by the Environmental Protection Agency.

B. This standard will not supersede any requirements imposed by Federal New Source Performance Standards, National Emission Standards for Hazardous Air Pollutants, Federal or State Prevention of Significant Deterioration Regulations, nor special permit conditions, unless this Standard would impose a more restrictive emission limit.

#### SECTION II — SULFURIC ACID MANUFACTURING

A. The rate of emissions of sulfur dioxide from sulfuric acid manufacturing shall be limited to no more than 4 pounds of sulfur dioxide per ton of 100% sulfuric acid produced and emissions of acid mist to 0.5 pounds of sulfuric acid per ton of 100% acid produced.

B. The maximum allowable stack outlet opacity from any source under this category in 20%.

# SECTION III -- KRAFT PULP AND PAPER MANUFACTURING

The rate of emissions from kraft pulp and paper manufacturing shall be limited to the following:

POLLUTANT	MEASURING MICR INTERVAL (1)(2)	OGRAMS/CUBIC METER
Saltar Dioxide	3 hour 24 hours annual	1300 (4) 365 (4) 80
Suspended Particulates	24 hours annual G.M. (3)	250 60
Carbon Monoxide	1 hour 8 hour	40 mg per cubic meter 10 mg per cubic meter
Ozone	1 hour	0.12 ppm (5)
Gaseous Fluorides (as HF)	12 hr. avg 24 hr. avg. 1 wk. avg. 1 mo. avg.	3.7 2.9 1.6 0.8
Nitrogen Dioxide	annual	100
Lead	Calendar Quarterly Mean	1.5

- (1) Arithmetic Average except in case of suspended particulates
- (2) At 25 C and 760 mm Hg.
- (3) Geometric Mean
- (4) Not to be exceeded more than once a year
- (5) Not to be exceeded more than one day per year

#### STANDARD NO. 3 EMISSIONS FROM INCINERATORS

All incinerators shall operate within the following emission limitations:

A. Particulates in the flue gas discharged into the atmosphere shall not exceed 0.5

pounds per million BTU of heat input to the incinerator, excluding auxiliary fuel

B. Emissions shall not produce smoke which exceeds twenty (20) percent opacity for an aggregate of more than six (6)

	Maximum allowable Stack Opacity	Maximum allowable emission of particulates in pounds/equivalent ton of air dried, unbleached pulp produced
Recovery Furnace	40%	2 75
Dissolving Tank	20%	1.0
Lime Kiln	20%	1 0

## **APPENDIX D**

Building 403, Steam Boilers 2, 3 and 5 Field Data

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BUILDING NUMBER			SOURCE NU	MBER		·	
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	ITEM	FINAL W		INIT	IAL WEIGHT (gm)		VEIGHT PARTICLES (gm)
FILTER NUMBER							
ACETONE WASHING Half Filter)	S (Probe, Front						
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11.		WAT	ER				
	ITEM	FINAL W		TINIT	IAL WEIGHT		WEIGHT WATER (gs.)
IMPINGER 1 (H20)		313.	82	20	かめ		113,8
IMPINGER 2 (H20)		18 9	B	2.0	¢ ¢		<b>113.8</b> -20.0
IMPINGER 3 (Dry)		·					
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tu.		GASES	(Dry)				
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VOL % 02	8,0	7.8	7,	9			7.9
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	AN N	403						ר י	<		052		OF
-	-M-1	Style HTB		;		<del> </del>	iean c	ear chat 20 in the	でで		PROBE MEATER SETTING	3 SETTING	
	SAMPLE BOX N	TUMBER O			<u> </u>	4	<u>-</u>		>		PROBE LENGTH	т	
	NETER BOX NIMBER	7.4.C					, · ·	5 4 5	<u></u>		7/		III
•	NUTECH	Ħ					17 2 <b>92</b> 00	) - B	<u> </u>		NOTICE ANEXAST O		sq ft
	Qw/Qm		MA	AHE-2.07	~				)	ਹੈ			
<u> </u>	Co		PSA	PSFS = 10.9672	9672					ļä	DRY GAS FRACTION (Fd)	TION (Fd)	
<b>L_</b>	TRAVERSE	SAMPLING	1/4 PE	Ш	STACK TEMP	VELOCITY	ORIFICE	GAS	GAS METER	ETER TEMP	SAMP	), E	IMPINGER
	POINT	TIME (min)	JA H 20)	(0F)	(Ts)	HEAD (Vp)	DIFF.	SAMPLE VOLUME (cu ft)	N (9F)	AVG OUT (Tm) (OF)	T BOX TEMP	× d c	OUTLET TEMP
5	-	0	5.v	4600		1005	6.1	7/0/801	1	$\vdash$	_	7	25
4	2	ī	-50	475		. 135	671		1100	0/		2	13
_1_	2	07	. 5.0	517		.125	5-1	' 1	611,	100		٥	63
_1_	- 7	[5	-5.5	125	-	11.5	67	750.555	28	7/	0 266	9	65
	7	0	-5.2	46.7		.125	67		4 5	-//	-	1	57
LI		5	/55	7 27		,175	6)		122	(1)	15 161	10	67
	2	2/2	-55	536		,125	6/1		92/	111	8 3	28	75
	7	(2	555	755		(2)	8	743.692	- 129	1/2	20	57	30
				7-502	5.5	NG: -125	P.1 = A.A	TOTAL	J.E	=115.3			
1								Š					
								ET=25.89	35			r	
لبل						SIMPLE	RITTE : D.	16473 neFm	F.				
L_						•	`						
1_			8				-						
												-	
T,	- 1									1			
-	UENL MAY 78				ı							,	1

ì

		VEY DATA SHEET NO. 2 Temperature Traverse)	3010
SHOW AFB		10 AUG-84	
	06 403	10 1700	
INSIDE STACK DIAMETER			Inches
STATION PRESSURE	ග		In Hg
STACK STATIC PRESSURE			In H20
SAMPLING TEAM OFAL	······································		
TRAVERSE POINT NUMBER	VELOCITY HEAD, Vp IN H20	CYCHONIC TO	STACK TEMPERATURE (OF)
1	φ. <b>4 g</b>	0	500
2	0.15	5	516
3	d:175	5	515
4	0.14	5	525
		AVG = 3.75°	
		FPS=29	
		1	
		FOM= 1725 T= 514	
	AYERAGE		
DEHL FORM 16		55	

	PF	RELIMINARY SUR' (Stack	VEY DATA Geometry)		
BASE		PLANT	^ 2		
SHAW ISF	3	BLDG 4	03		
SHOW AF	8	OEHL			
SOURCE TYPE AND MAK BOLLER # SOURCE NUMBER	53 +#2				
SOURCE NUMBER		INSIDE STACK DIAM	ETER		Inches
RELATED CAPACITY			TYPEF	UEL	
3 /4	E OF NIPPLE TO II	NSIDE DIAMETER	<u> </u>		Inches
NUMBER OF TRAVERSES		NUMBER OF POINTS	TRAVERSE		
2	1.0	OCATION OF SAMPLE	OC POINTS A	LONG TRAVERSE	
		247.110		TOTAL DISTANCE	FROM OUTSIDE
POINT	PERCENT OF DIAMETER	INCIDE	WALL	OF NIPPLE TO SA (Inche	MPLING POINT
1		0.	8	4.1	
2		3.1	<b>5</b>	6,3	
3		9.8	2	12.4	
4		11.5	/	14.7	

	AIR POLI	LUTIO	N PARTICULA	ATE ANA	LYTICAL	DATA		
BASE	1	DATE			10	RUN NUMBER		
Share Bldg 40		16	9 Aug 8	8		Boiler	#	3
BUILDING NUMBER			Us	OURCE NU	MBER			
Bldg 40	<u>3</u>							
1.			PARTICUL	ATES				
17	TEM		FINAL WE		INITI	AL WEIGHT	w	EIGHT PARTICLES
FILTER NUMBER								
ACETONE WASHINGS ( Hall Filter)	(Probe, Front							
BACK HALF (If needed	d)							
			Total Wei	ght of Partic	ulates Calle	ec te d		gm
11.			WATE	R				
17	TEM		FINAL WE	ŧG H T	INITI	AL WEIGHT		WEIGHT WATER (gm)
IMPINGER 1 <i>(H20)</i>	-		7 196		2	00		-4,0
IMPINGER 2 (H20)		292		2	ØØ ØØ		-4.0 92.0	
IMPINGER 3 (Dry)								
IMPINGER 4 (Silica Gal)			206.2 200		54		6.2	
				ght of Water	Collected			94,2 cm
111.		<del></del>	GASES	1		<u> </u>		
ITEM	ANALYSIS 1		ANALYSIS ANALYSIS 2 3		ANALYSIS 4		AVERAGE	
VOL % CO <sub>2</sub>	8.1		8, Ø	8	°, ¢			8,0
VOL % 0 <sub>2</sub>	7,2		7.2	7	-1			7.2
VOL % CO								
VOL TIN2								
		V <sub>0</sub>   %	% N <sub>2</sub> = (100% - % C	02.502.	% CO)			

				PARTICULATE SAMPLING DATA SHEET	SAMPLING DAT	A SHEET				
RUN NUMBER	が井の井の	SCHEMA	SCHEMATIC OF STACK CROSS SECTION	ROSS SECTION	EQUATIONS			AMBIENT	TEMP	
DATE	8				0 11 24 0	۲.		STATION	N PRESS	
PLANT L	エイン	<b>9</b>	(L) (D) (D) (D)	× × /	H = 5130	Co Co	Tm. Vp		HEATER BOX TEMP	31 S
No. of the last of	( ) 34				Pre (cal	challed 15	Prelease challed 15 inth good		PROBE HEATER SETTING	45 91
SAMPLE BOX NUMBE	JMBER	A			Post (c.	ik check		PROBE LENGTH	ENGTH	
METER BOX NUMBER	WBER		Punking Cost		15 = 33.	3.8°F		NOZZLE ARBA	AREA (A)	
Qw/Qm		<del>-</del>	11	3 to heap day gal	70=120	7.6		1-	7	T be
ပိ		<b>T</b>		-	PSTS = 10.3136	3136		ــــــــــــــــــــــــــــــــــــــ	DRY GAS FRACTION (Fd)	
TRAVERSE	SAMPLING	STATIC STATIC PRESSURE	CK TE	P VELOCITY (S) HEAD	ORIFICE DIFF.	GAS	GAS METER TEMP	EMP	SAMPLE	IMPINGER
NUMBER	(min)	18 P	(oF)	(oR) (VP)		(a. fi)	(OF) (OR)	(0F)	TEMP (oF)	TEMP (OF)
7	20	-5.0	253	571,	1, 1	197,0	\display = \frac{1}{\sqrt{\sq}\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sq}\sqrt{\sq}}\exitting{\sqrt{\sq}}}}}}}}\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sq}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}	+174	759	25
42	2	\$ 5'	7776	145	3/	17 03 6	12/	45	25.5	70
+	1.2	7.2	2007	AC:	1	12:12	h7/	+777	147	led.
6	0	-5.9	300	010	7./		129	611	248%	68
100	0,	250	700	797	17/15	100 100 100	82)	121	246	523
J	7	-50	(F)	701	6)	84,4152	(5 (	722	246	7/2
					11.09.1	43 - 22	1/2/			
	1 1									
OEHL FORM	18					! !				

	PR	ELIMINARY SUR (Stack	VEY DATA ( Geometry)	SHEET NO. 1	
BASE Shew	1	PLANT (	That (	B lely 402)	
DATE 19 MAN	VA	SAMPLING TEAM	7		general (1) page ga-arana
SOURCE TYPE AND MAK	Bito	B12, 40	<del>1</del> 3		
SOURCE NUMBER	1) 3 (18)	INSIDE STACK DIAM	ETÉR	•	Inches
RELATED CAPACITY		1 2. 1	TYPEFU	EL .	ucits
DISTANCE FROM OUTSID	E OF NIPPLE TO IN			97 j	Inches
NUMBER OF TRAVERSES		NUMBER OF POINTS	TRAVERSE		Liches
	LO	CATION OF SAMPLI	NG POINTS AL	ONG TRAVERSE	
POINT	PERCENT OF DIAMETER	INSIDE		TOTAL DISTANCE FROM OF NIPPLE TO SAMPL (Inches)	M OUTSIDE ING POINT
1		1,1		4,3	
2		3.0	7	7,2	
3		11-8	3	15.1	
4		14:	7	17.9	
	<u> </u>				

		YEY DATA SHEET NO. 2 emperature Traverse)	
BASE		19 Aug 8	 ੪
Blda 403	Heating Shop	Boiler #5	
INSIDE STACK DIAMETER	· · · · · · · · · · · · · · · · · · ·		Inches
STATION PRESSURE			In Hg
STACK STATIC PRESSURE - 645	······		In H20
SAMPLING TEAM	· · · · · · · · · · · · · · · · · · ·		
TRAVERSE POINT NUMBER	VELOCITY HEAD, Vp IN H20	√ V <sub>p</sub>	STACK TEMPERATURE (0F)
1		Ø	
2		Ø	
3,		φ	
4		Ψ	
<del></del>	AVERAGE		

	AIR POLI	LUTIO	ON PARTICUL	ATE ANA	LYTICAL	DATA		
S/ww		DATE	19 Ary	83		Bulle	n #	5
BUILDING NUMBER	ian-gashr	تُما		BIJ.	1	ý3		
1.	(1		PARTICU	<del></del>	<del>/</del>		<del>,                                     </del>	
	ITEM		FINAL WE		INIT	IAL WEIGHT (gm)	*	EIGHT PARTICLES (gm)
FILTER NUMBER								
ACETONE WASHING Half Filter)	is (Probe, Frant							
BACK HALF (II nee	ded)							
			Total Wei	ight of Partic	culates Coll	ected		<b>g</b> an
11.			WATE	ER	· · · · · · · · · · · · · · · · · · ·	·	<del>,</del>	
•	ITEM		FINAL WE (@m)	IGHT	INIT	IAL WEIGHT (gan)		WEIGHT WATER (gm)
IMPINGER 1 (H20)		i	267	', Ø	20	) O		67-Ø
IMPINGER 2 (H20)			217	<u></u> φ	2	00		12-Ø
IMPINGER 3 (Dr).			d	_4		Φ		.4
IMPINGER 4 (SIIIca Gal)		208.0 200			· 8,Ø			
		Total Weight of Water Collected			87,4 am			
111.		<del></del>	GASES	(Dry)		r		
ITEM	ANALYSIS		ANALYSIS 2	ANAI	_YSIS 3	ANALYSIS		AVERAGE
VOL 5. CO2								
VOL % 02								
VOL % CO								
VOL % N2								
		Vol %	N2 = (100% - % C	02-%02-	% CO)			

# APPENDIX E

Building 611, Steam Boiler Field Data

<u> </u>					ď	ARTIC	PARTICULATE SAM	SAMPLING DATA	A SHEET					
œ	RUN NUMBER		SCHE	MATIC OF	SCHEMATIC OF STACK CROSS SECTION	SSS SECTION		EQUATIONS			A	AMBIENT TEMP	ЕМР	
	PLAMS ( C)	286					~~~~	$^{\circ}R = ^{\circ}F + 4\alpha\theta$ $^{\circ}H = \begin{bmatrix} 5130 \cdot 1 \end{bmatrix}$	Fd.Cp.A 2	$rac{Tm}{Ts}$ . Vp	<u> </u>	STATION PRE  29. ( HEATER BOX	RESS 605 DX TEMP	H III
1-	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	61				ン	1)	Pie (earliched		Egord at 1Sil	-121	ROBE HE	PROBE HEATER SETTING	40
Ŋ	SAWPLE BOX NU	3	1121	TS = 409.1	10 to 1				>	<u> </u>		PROBE LEN	ENGTH	.5
12	METER BOX NUMBER	MBER	1= 1	1.5/2	-/ 9						ž	NOZZLE AF	AREA (A)	13 03
b lo	Ów/Òm Co		411F.	AIr= 1.4 PSFS = 10.2839	1839						Q RO	S CAS	L FRACTION (Fd)	
						-			.					
65	TRAVERSE	SAMPLING	STATIC PRESSURE		CK -		VELOCITY	ORIFICE DIFF.	SAMPLE	IN AVG O	ER TEMP	<del>-   -</del>	SAMPLE BOX	IMPINGER OUTLET
	NUMBER	(B1n)	(tn H20)	(	(oR)	1	(qV)	(H)	(cu ft)	(oF) (oR)	$\dashv$		Gen	(0F)
	-	) C	12.00	45.	<b>*</b>	-	122	77	2000	200	XX	7	1 / 25	77
	1"	10,0	200	12/4		-	55.	17/1		28	\$ \$ \$	1-3	742	1.7
	7		-3.0	7		-	gay	5)		8.4	Dec c	7	293	20
	4	200	-22.00	777	- 1		970	2,7		40,	> &		243	65.
1_	31	50		ソレ	4	-	6,0)	7		46	2000	ه مر	295	67
	B	17.5	-3.0	13	1		.180	5,1	50,015	76			542	0
_ـــــــــــــــــــــــــــــــــــــ		0	-10	417	-		.115	<i>h'</i> )		09/	a/	16	247	26
	.,		20	387			( <b>8</b> %	þ/		(0)	2/	10	542	59
	42	200	3,5	427		-	2,0	7		102	107	-	22/	S. S
	S	(o)	-3.0	42(			000	7		106	ŋ	13	750	24
	عد	7.5	3.0	420	ce's	-	089	2 /		107	9/2	25	10000	25
	8		-2.0	433	++		6/1	)//   	868.00	69,	2/	0,0	\$52	ES C
								TETE	1 543 - 22.	298				
												_		
لــــــــــــــــــــــــــــــــــــــ														
'ل	DEHL FORM	18		-			,	A Service of the Serv						

	PRE	ELIMINARY SURVEY DATA (Stack Geometry)	
BASE Street At-	-B '	Bldg 611	
PATE 19 Aug 88		AMPLING TEAM	
SOURCE NUMBER		IS 75	
RELATED CAPACITY	<u>_</u>	TYPE FL	Inches UEL
DISTANCE FROM OUTSID			OI I
NUMBER OF TRAVERSES	77.0	NUMBER OF POINTS/TRAVERSE	Inches
	2	CATION OF SAMPLING POINTS A	LONG TRAVERSE
POINT	PERCENT OF DIAMETER	DISTANCE FROM INSIDE WALL (Inches)	TOTAL DISTANCE FROM OUTSIDE OF NIPPLE TO SAMPLING POINT (Inches)
		0.5	3,8
2		1.4	4,7
3		2.7	5,9
4		4.4	7,7
5		9.3	12.6
(a		(1.1	14.3
7		12.3	15.6
B		13.3	16.5
· · · · · · · · · · · · · · · · · · ·			
	<del>,</del>		
			,

### PRELIMINARY SURVEY DATA SHEET NO. 2 (Velocity and Temperature Traverse) 19 Aug 88 BASE BOILER NUMBER de 611 INSIDE STACK DIAMETE Inches STATION PRESSURE In Hg In H20 2 F STACK TEMPERATURE (0F) TRAVERSE POINT NUMBER VELOCITY HEAD, Vp IN H20 20 AVERAGE

	AIR POLLUTI	ON PARTICUL	ATE ANA	LYTICAL	DATA		
Shaw	AFB DATE	19 Aug	80		RUN NUMBER		
BUILDING NUMBER		Ó	SOURCE NU	MBER Wed S	skom bo	rle	(
I.		PARTICU	LATES				
łT	EM	FINAL WI		INIT	AL WEIGHT (gm)	w	EIGHT PARTICLES (gm)
FILTER NUMBER							
ACETONE WASHINGS ( Helf Filter)	Probe, Front		 				
BACK HALF (if needed	)						
		Total We	ight of Partic	ulates Colle	oc ted		gm
11.		WAT	ER	<del></del>		, <u>.</u>	
IT	EM	FINAL WI		INIT	AL WEIGHT		WEIGHT WATER
IMPINGER 1 (H20)		249	,5	2	00		49.5
IMPINGER 2 (H20)		20	4.5	Z	00		4.5
IMPINGER 3 (Dry)			1.0		Ø		1.0
IMPINGER 4 (SIIIca Gel	)	206	,2	20	DO		6,2
		Total We	ight of Water	Callected			61.Z am
111,		GASES			<del></del>		
ITEM	ANALYSIS	ANALYSIS 2	ANAL	YSIS 3	ANALYSIS 4		AVERAGE
VOL % CO <sub>Z</sub>							
VOL % 0 <sub>2</sub>							
VOL % CO							
VOL % N <sub>2</sub>							
	V-1	% N <sub>2</sub> = (100% - %	CO2. % O2.	% CO)			

#### **APPENDIX F**

Building 922, Hot Water and Steam Boiler Field Data

2	7.00 1.4 7.00 1.4		PART	RTICULATE SAN	TICULATE SAMPLING DATA SHEET	HEET				
RUN NUMBER			ACK E	SSECTION	EQUATIONS			AMBIENT TEMP	TEMP	
$\bigcirc$	) (		12 1. Kg	(	$^{\circ}R = ^{\circ}F + 460$			2		स् ०
DATE 27	27 Av. 89			1/2		] 2	: .s	29	3 8/5	In Hg
PLANT		4.0	Parkey	% {}	# E	· ` `	Ts. Vp	HEATER	HEATER BOX TEMP	
BASE		24		<u> </u>	Peleak	Releate chucky	of socked	PROBE II	PROBE HEATER SETTING	J <sub>O</sub>
SAMPLE BOX NUMBER	TUMBER					2	12 m	PROBE LENGTH	ENGTH JO	
METER BOX NUMBER	JMBER	7	253.6					NOZZLE	NOZZLE AREA (A) Dane	
т <b>у</b> /мо		13.	In = 111.9					Ĉ	51	l) bs
ပိ		13.55	611 = 1.7 1315 = 1.4105					DRY GAS	DRY GAS FHACTION (FG)	
TRAVERSE	SAMPLING	NATE OF THE PERSON OF THE PERS	STACK TEMP	VELOCITY	ORIFICE	GAS	GAS METER TEMP	ЕМР	SAMPLE	IMPINGER
POINT NUMBER	TIME (BID)	PRESSURE	(oF) (Ts) (oR)	HEAD (Vp)	DIFF.	`	IN AVG (Tm)	OUT (9F)	BOX TEMP (oF)	OUTLET TEMP (OF)
+	٥	-3 Ø	252	4.001	<b>b</b>	0		107	226	77
7,	5	-30	27	500.0	77		101	307	1/3/6	64
47	7	6.5.	1,57	Ø. 66	7		113	60/	25/2	200
	•				#					
4	>V	1. C.	255	0.00	17,		1/6	110	254	67
3	10		257	0.005	h		112	112	25.1	67
7	5	-3.0	256	d 002	1.4	[4,01]	118	115	248	BB
					TUTAL S	43.22.91	70			
OEHL FORM	8 4									

	PI	RELIMINARY SURV	(EY DATA SHE Geometry)	EET NO. 1	
BASE	T.Q.	PLANT	ces Club	,	
Shaw It	r D	SAMPLING TEAM	ces Club		<del></del>
22 Hig 8					
SOURCE TYPE AND MAK	Fa Boile	.(			
SOURCE NUMBER		INSIDE STACK DIAM	ETER		
RELATED CAPACITY		8.0	TYPE FUEL	Inches	<del></del>
DISTANCE FROM OUTSID	S OF NIBBLE TO I	NCIDE DIAMETER	1 6HS		
DISTANCE FROM COTSIC	Dun	elo		Inches	
NUMBER OF TRAVERSES	s	NUMBER OF POINTS	TRAVERSE		• • •
	L.	OCATION OF SAMPLIN	G POINTS ALONG	TRAVERSE	
POINT	PERCENT O DIAMETER		WALL	TOTAL DISTANCE FROM OUTSIDE OF NIPPLE TO SAMPLING POINT (Inches)	-
		,5		,5	
2		2.0	0	2,6	
3		6.0	Ø	6.0	
4		7.5	j	7.5	

### PRELIMINARY SURVEY DATA SHEET NO. 2 (Velocity and Temperature Traverse) INSIDE STACK DIAMETER Inches STATION PRESSURE 29,815 In Hg STACK STATIC PRESSURE In H20 SAMPLING TEAM CYCLOHIC TRAVERSE POINT NUMBER VELOCITY HEAD, Vp IN H20 STACK TEMPERATURE (0F) $\propto$ 4 AVERAGE

	AIR POLLU	TION PARTICUL	ATE ANA	LYTICAL	DATA		
BASE	DA.		2	*	RUN NUMBER		· · · · · · · · · · · · · · · · · · ·
5ha	(1)	22 April	\$ 8K				
BUILDING NUMBER			SOURCENU	MBER			
922 ( 00	new (lub)		Pot	Coat	es Heat	1 -7	
1.		PARTICU	LATES				
17	TEM	FINAL WE		INIT	AL WEIGHT	w	EIGHT PARTICLES
FILTER NUMBER						<u> </u>	
ACETONE WASHINGS Half Filter)	(Probe, Front						
BACK HALF (if needed	d)						
7 H		Tatal We	ight of Partic	ulates Colle	ected		gm
11.		WAT	ER				
רו	TEM	FINAL WE		INIT	AL WEIGHT		WEIGHT WATER (gm)
IMPINGER 1 (H20)		226	,0	2	6.00		26.0
IMPINGER 2 (H20)		206.	2	7	200.0		6.2
IMPINGER 3 (Dry)		Ø			$\varphi$		$\not \supset$
IMPINGER 4 (SIIIca Ge	n	201.		2	D0.0c		7.5
		Tatal We	ight of Water	Collected			39.7
III.		GASES	(Dry)				
ITEM	ANALYSIS	ANALYSIS 2	ANAL	YSIS 3	ANALYSIS 4		AVERAGE
VOL % CO <sub>2</sub>							
VOL % 0 <sub>2</sub>							
VOL % CO							
VOL % N2							
		1 % N <sub>2</sub> = (100% - %	CO2 - % O2 -	% CO)			

Š	13UDG: 422		PA	H H	SAMPLING DATA	SHEET				
HOUBER HTICE	Chel	SCHEMA		SSECTION  3 FT 2	EQUATIONS ${}^{O}R = {}^{O}F + 460$			AMBIENT TEMP	7 EMP 89	5
18 Am	89 STEPM	<del>-</del>	\$0 \ \ \ \ \ \	16/34	H = 5130	3.d. Cp. A 2	Tim. Vp	STATION	19, 635	In Hy
gas : ha	150 F		1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	7-4-47					MEATER BOX TEMP PROBE HEATER SETTING	9 Ho
SAWPLE BOX NU	MAER JWBER		(cut) , but	~	26 (52 K	Fort Lak chale at Six de cont	12 God 200		ENGTH	
A HE A SUR A CORR OF THE A		17.2	295.5°F			•		NO.7.7. F	47.342	ili
Qw./Qm		17.	Fr. : 95.70F					ĉ	:	t) bs
చి		1355 = 44	1355 = 44233					DRY GAS	DRY GAS FRACTION (Fd)	
TRAVERSE	SAMPLING	STATIC PRESSUPE	STACK TEMP	VELOCITY	ORIFICE DIFF.	GAS	GAS METER TEMP	TEMP	SAMPLE BOX TEMP	IMPINGER OUTLET
NOMBER	$\rightarrow +$	-28		(d <sub>A</sub> )	€7	992. (On Ft)	(°F) (°R)	(°F)	(°F)	
3	70	-3.5	331	,035	7, 7		94	8.1	242	63
2	- (5	-30	240	,035	1 57	QQ 3.640	44	9(	242	25
D.	C	23.6	206	) <b>©</b> ,	1,4		86	96	243	73
36	207	u,	32.5	435	777	W.18 .1111	165	18	15.24	68
		95-	12	a(Ca)	, ,	77-77	10.	7,3		- C20
						CABIC	1144			
						7 = 14	7.7.1			
OEHL FORM	18				34.45. 40. E	A THE PARTY OF THE				Property and Committee of the Parket State of the Control of the C

	PR	ELIMINARY SURVE (Stack G		NO. 1	
BASE	77	PLANT	0( (		<del></del>
Shaw AF	13	Otticers SAMPLING TEAM	Club		
DATE 18 Aug 8	8				
SOURCE TYPE AND MAKE	I STORY	STEPM	heat		
SOURCE NUMBER		INSIDE STACK DIAMET	ER		·
$\mathcal{O}_{\mathbf{a}}$		9.7		<del>,</del>	Inches
RELATED CAPACITY		COS OLIVETER	TYPE FYEL Gas		
DISTANCE FROM OUTSID	13 Ø	(3 2 S)	$\bigcup$		
NUMBER OF TRAVERSES		NUMBER OF POINTS/T	RAVERSE		Inches
2	_	4	₹		
	LO	CATION OF SAMPLING	POINTS ALONG TRA	VERSE	
POINT	PERCENT OF DIAMETER	DISTANCE F INSIDE WA (Inches	LL	TOTAL DISTANCE FROM OU OF NIPPLE TO SAMPLING (Inches)	TSIDE POINT
		0.7		3.9	
2		2.4		5.7	
3		7.3		10.6	
Ц		9,1		12.3	
	<del></del>			·····	
7-1-1-1					

		'EY DATA SHEET NO. 2 emperature Traverse)	
Show AFR		18 Aug 88	
Officers Clu	6 STEAM BOILE	iR	<del></del>
INSIDE STACK DIAMETER 9.7			Inches
STATION PRESSURE			In Hg
STACK STATIC PRESSURE  - 02			In H20
SAMPLING TEAM			
TRAVERSE POINT NUMBER	VELOCITY HEAD, Vp IN H20	d man	STACK TEMPERATURE (OF)
		Ø	
2		Ø	
3	; ;	Ø	
4		φ	
	!		
	<b> </b>		
			<del> </del>
	1		
	<del></del>	<b></b>	
	AVERAGE		

	AIR POL	LUTION PARTICU	LATE ANALYT	ICAL DATA	
SHAW	AFB	13 A	18821	RUN NUMBER	
BUILDING NUMBER	- Concert		SOURCE NUMBER		
1.		PARTICI	· · · · · · · · · · · · · · · · · · ·		
	ITEM	FINAL W		INITIAL WEIGHT	WEIGHT PARTICLES (ám)
FILTER NUMBER					
ACETONE WASHINGS Hall Filter)	S (Probe, Front				
SACK HALF (It need)	ed)				
		Total We	eight of Particulate	s Collected	gm
11.		WAT	ER		<del></del>
	TEM	FINAL W		INITIAL WEIGHT	WEIGHT WATER (@m)
MPINGER I (H20)		304	1.0	200.0	104.0
'MPINGER 2 (H20)		216	.0	200.0	16.6
:MPINGER 3 /Dry;		$\emptyset$		otin	$\emptyset$
IMPINGER 4 (SIlica G	el)	206.	, 2		6.2
		Total We	eight of Water Calle	cted	12 6,2 am
111.	T	GASES	(Dry)		
ITEM	ANALYSIS	ANALYSIS 2	ANALYSIS 3	ANALYS	S AVERAGE
VOL 1 CO2					
vo∈ * 0 <sub>2</sub>					
V9L # C0					
VOL ₹ N2					
		Vel % N2 = (100% - %	CO2 - % O2 - % CO	)	

#### **APPENDIX G**

Building 1046, Hot Water Boiler Field Data

	A135-1016			PARTI	T.E	SAMPLING DATA SHEET	A SHEET				
RUN NUMBER	NO	SCHEN.	SCHEMATIC OF STACK CROSS SECTION O.	K CROSS SE	CTION	EQUATIONS			AMBI	AMBIENT TEMP	
DATE DATE	2 12224		(	-	; <b>~</b>	OR = OF + 400	0,		TATS	STATION PRESS	40
22 Ay 38	28 29	100	5		<u> </u>		- 5130-Fd-Co. A 7 2		· ·	29,915	en He
PLANT					~ <u>~~</u>	#	· —	T V.	HEAT	HEATER BOX TEMP	c
BASE	15D	tezyi	(cooping be	\$ ( )	(زر	(		12 Sec. 12.		PROBE HEATER SETTING	4c 5N
SAMPLE BOX NUI	NUMBER	17.	E. 358 %			1516 (4)	Contract forms of the state of			PROBE LENGTH	
METER BOX NUMBER	BER	17. E	Fm: 96°F						NOZZLE	LE AREA (A)	Ξ
₩, <b>¢</b> m		11 = H17	١٠٦						Ĵ	10	sq ft
°C		PS13 =	PS13 = 6,1812						DRY	CAS FRACTION (Fd)	(F
TRAVERSE	ON LIGHT		STACK TEMP	EMP	VIII OCIAN	ORIFICE	GAS	GASME	GAS METER TEMP	SAMPLE	0.3.5 N
POINT	TIME (min)	PRESSURE (19 H20)	(oF)	(Ts) (0R)	HEAD (VP)	DIFF.	SAMPLE VOLUME	× (6)	AVG OUT	BOX	OUTLET
	D),	-30	193		,03	5.1	84.669	1	8	230	71
74	50	0,7,	3/4		700	('d')		32	40	23'(	70
13	7.5	-3W	373		ho,	1,4	445		95	236	(2,5)
5	701	-30	_	+	62	5.7		162	85	355	66
7	150	3,40	138		200	77		14	731	226	
8	17.5	-3.W	386		183	7	96.105	115	\$///	234	E
B (	19	-36	198		70'	١, ط	122,362	73.8	78	131	139
7	25	2.0	200		20,	5		200	83	235	68
7	7.5	1, J.	7		. D75	7 -	35	96	858	240	636
5	0,0	3.0	439		, 080	þ,		9(	5,8	54	33
20		(1) 1 4 T	778		050	٥ .	**		38	24	68
0	7.5	-3.0	348		,028	))	7.80.651	103	86	241	82
						70TH L ST	-3 22,	591,			
OEHL FORM	18										

	PI	RELIMINARY SURVE	Y DATA SHEET NO. 1 cometry)	
	<del> </del>			
Shaw		SAMPLING TEAM	linic	
22 Aug 8	<i>38</i>		····	
SOURCE TYPE AND MAK	er Bules			
SOURCE NUMBER		INSIDE STACK DIAMET		inches
RELATED CAPACITY			TYPE FUEL  GAS	
DISTANCE FROM OUTSID	5,75 V	n, pole total THUMBER OF POINTS/T	20.7	5 Inches
NUMBER OF TRAVERSE	5	NUMBER OF POINTS/T	RAVERSE /	
	L	OCATION OF SAMPLING	POINTS ALONG TRAVERSE	
<del> </del>	T			
POINT	PERCENT O DIAMETER		LL OF	AL DISTANCE FROM OUTSIDE NIPPLE TO SAMPLING POINT (Inches)
				6.3
2				7,3
3				8.7
4				10.6
5				15.9
6	-			17-8
7				19.2
B				20.3

# PRELIMINARY SURVEY DATA SHEET NO. 2 (Velocity and Temperature Traverse) BASE 22 Aug 88 Inches In Hg In H20 √ Vp TRAVERSE POINT NUMBER VELOCITY HEAD, Vp IN H20 STACK TEMPERATURE (0F) AVERAGE

		UTION PARTICUL	ATE ANALY			
Shara)		22 Augo	A 89		RUN NUMBER	
BUILDING NUMBER	Ental Clemin		SOURCE NUMB	ER		
1.		PARTICU	ILATES			
	ITEM	FINAL WE		INIT	IAL WEIGHT (gm)	WEIGHT PARTICLES
FILTER NUMBER						
ACETONE WASHINGS Hall Filter)	S (Probe, Front					
BACK HALF (If need	ed)					
		Total We	ight of Particulo	ites Calle	ected	<b>ģ</b> a.
и.		WATI	ER			
	ITEM	FINAL WE		INIT	IAL WEIGHT	WEIGHT WATER
IMPINGER 1 (H20)		255	ط.	2	∞′ 9	55.6
IMPINGER 2 (H20)		208	.0	9	$G.\infty^0$	8.0
IMPINGER 3 (Dry)		Ø			Ø	Ø
IMPINGER 4 (Sitica G	o1)	207.	,4	2	QQ. Q	7.4
		Total Wel	ight of Water Col	llected		71.0 sm
III.		GASES	(Dry)			
ITEM	ANALYSIS 1	ANALYSIS 2	ANALYS	is	ANALYSIS 4	AVERAGE
vol ₹ co <sub>2</sub>						
VOL % 02						
VOL % CO						
VOL S N2						
		Vol % N2 = (100% - % (	CO <sub>2</sub> . % O <sub>2</sub> . % (	CO)		

#### **APPENDIX H**

Building 1102, Hot Water Boiler Field Data

				PARTIC	CULATE SAM	PARTICULATE SAMPLING DATA SHEET	SHEET				
PLAN TOWAGER  DATE  12 FUND  PLAN TO THE BOX NUMBER  METER BOX NUMBER  CO  CO	1602 Luxle boil 2 AFD NUMBER UMBER		SCHEMATIC OF STACK CROSS SECTION  Schematic OF STACK CROSS SECTION  A B C C C C C C C C C C C C C C C C C C	CROSS SE	NOL CALLON	EQUATIONS $^{\circ}R = ^{\circ}F + 460$ $H = \left[\frac{5130 \cdot 1}{C}\right]$ $D_{\ell}e^{-\left(C_{\ell}\mathcal{H}\right)}\mathcal{L}_{\ell}^{\ell}$	FOCE A 2.	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	STATION STATION STATION STATION PROBE H PROBE L NOZZLE CP	STATION PRESS  \$\int C \frac{\fir}{\frac{\fir}{\frac{\fir}{\fir}}}}}}}{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\	op Ao Sa fi
NUMBER TO SO CLAP TO CO CLAP TO CO CO CLAP TO CO	10000000000000000000000000000000000000	in which the E	377.75 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(0R)	(3) (3) (3) (3) (3) (3) (3) (3) (3) (3)	BESS. 33.	COLUME		(a) (B) (B) (B) (B) (B) (B) (B) (B) (B) (B	200 200 200 200 200 200 200 200 200 200	#E 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6
V 316	1-1-11111-1-1	-5.6 -5.6 -5.6 -5.0	77627		600 900 910 910	μ', μ', μ', η χοτ	156,427	27 2002		243 248 252 253 253	8200ca 6200ca

	PREL	IMINARY SURVEY DATA (Stack Geometry)		
ShowAtB	PL	Bld 1102		
DATE /	SA	MPLING TEAM		
SOURCE TYPE AND MAKE	Water Bor	<u> </u>		
SOURCE NUMBER	Ward Doc	SIDE STACK DIAMETER		
RELATED CAPACITY		9.75 TYPE F	Inches	
DISTANCE FROM OUTSIDE	/	DE DIAMETER	011	
NUMBER OF TRAVERSES	(3.25)	MBER OF POINTS/TRAVERSE	Inches	
	1.004	STION OF SAMPLING POINTS A	ALONG TRAVERSE	
POINT	PERCENT OF DIAMETER	DISTANCE FROM INSIDE WALL (Inches)	TOTAL DISTANCE FROM OUTSIDE OF NIPPLE TO SAMPLING POINT (Inches)	
1			3.8	
2			4.3	
3			5.1	
4			6.4	
5			9.8	
62			11.1	
7			12.0	
8			12.5	
	-			

OEHL FORM 15

### PRELIMINARY SURVEY DATA SHEET NO. 2 (Velocity and Temperature Traverse) DATE INSIDE STACK DIAMETER 9.75 Inches STATION PRESSURE In Hg STACK STATIC PRESSURE In H20 SAMPLING TEAM ~ \\ TRAVERSE POINT NUMBER VELOCITY HEAD, Vp IN H20 STACK TEMPERATURE (0F) 15 15 15 AVERAGE

OEHL FORM 16

	AIR POL	LUTION PARTIC	ULATE ANA	LLYTICAL	_ DATA		
BASE		DATE			RUN NUMBER		
Shaw		23 A	~ 88				
BUILDING NUMBER			( SOURCE NE	JMBER			
#11002		_		571-tr	red water	21 b	or ler
1.		PART	ICULATES	<del></del>		<del></del>	
	ITEM	1	. WEIGHT (gpn)	INIT	IAL WEIGHT	WE	IGHT PARTICLES
FILTER NUMBER							
ACETONE WASHINGS Half Filter)	; (Probe, Front						
BACK HALF (If needs	ed)						
		Total	Weight of Partic	culates Coli	ected		<b>g</b> m
11,		W	ATER	T			
1	ITEM		WEIGHT	INIT	IAL WEIGHT		WEIGHT WATER (gm)
IMPINGER 1 (H20)	IMPINGER 1 (H20)		رن (ت،	20	6. Oc	(	29.0
IMPINGER 2 (H20)		214.	0	20	G.0C		14.0
IMPINGER 3 (Dry)		2.	0		$\overline{\phi}$		2.0
IMPINGER 4 (Stitca G	•()	209	7.7_	2	.00		<b>9</b> .7
			Weight of Water			6	54.7 cm
111.	T		ES (Drv)		Υ		
ITEM	ANALYSIS	ANALYSIS 2	ANAI	L YSI\$ 3	ANALYSIS 4		AVERAGE
VOL % CO <sub>2</sub>							
VOL <b>∜ 0</b> 2							
VOL % CO							
VOL % N2							
		Vel % N2 = (100% -	% CO <sub>2</sub> . % O <sub>2</sub> .	- % CO)			

#### **APPENDIX I**

**Building 1130, Steam Boiler Field Data** 

ANTER BOX NUMBER NOTTE	Sp. Ling	SCHEMATIC OF 3  15: 407.9  15: 40	3643 3643 3643 3643 57ACK TEMP 57ACK TEMP 6F) (TS) 67	VELOCITY HEAD (VP)	ORIFICE  ORIFICE  ORIFICE  SAMPLE  TOST  ORIFICE  SAMPLE  TOST  ORIFICE  OR	GAS SAMPLE VOLUME (UT)	;	STATION PRESS STATION PRESS STATION PRESS HEATER BOX TE PROBE LENGTH PROBE LENGTH CP CP CP	STATION PRESS  39,635  HEATER BOX TEMP PROBE HEATER SETTING PROBE LENGTH  CP  CP  SAMPLE BOX TEMP	
15 August 1978		112 112 12 12 12 12 12 12 12 12 12 12 12	36#3 36#3 36#3	VELOCITY HEAD (VP)	H= [5130.Fd.  Pre leah lk.  Dost leah (  ORIFICE  DIFF.  PRESS.  (H)	SAMPLE VOLUME (CAT)		HEATER HEATER PROBE L NOZZLE CP	19.625 190x TEMP HEATER SETTING HEATER SETTING SERACTION (FG) SAMPLE BOX TEMP	
		IN ITE IZ SEED ON THE SEED OF	36 43 36 40 36 40 36 40 36 40 36 40 36 40 36 40 36 40 36 40 36 40 36 40 36 40		Pre lear che	SAMPLE VOLUME (OUT)		PROBE I PROBE L NOZZLE CP	TENGTH  S AREA (A)  S FRACTION (FG)  S AMPLE  BOX TEMP	)
		17. 12. 12. 12. 12. 12. 12. 12. 12. 12. 12	36#3 36#3 36#3	5.	ORIFICE DIFF. PRESS.  (H)	Chack at sample volume (at)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	N   N   N   N   N   N   N   N   N   N	SAMPLE BOX TEMP	
144 1 1		25.55 S. 25.	3643 3643 (or)		ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (cu ft)	TER	]	S FRACTION (Fd)  SAMPLE  BOX TEMP	! i
1 1		PSJS:	1F1 1 1	VELOCITY HEAD (VP)		GAS SAMPLE VOLUME (QL ff)	GASMETER	<b>l</b>  ≻	S FRACTION (FG)	î
<b>ೆ</b>		STELO RESOLNE (CAT 20)	F	VELOCITY HEAD (Vp)		GAS SAMPLE VOLUME (cu ft)	GASMETER	-	SAMPLE BOX TEMP	  -  -
-		RESSURE (F-H20)		(VP)		SAMPLE VOLUME (QL ft)		2 TEMP	BOX	IMPINGER
POINT T		200	280	80,		ľ	OF) (OR)	OUT (oF)	(OF)	OUTLET TEMP (OF)
		- 2,0			1	ગ	++	+	238	18
7		ルだー	200	0	1,4		9,2	42	7.28	77
7	5,7	-3.0	441	61,	7.4.		20	93	14(	689
1	<b>6</b> v	-3.0	507	.12	7/		100	96	750	
2		3.6	7,4%	17,	127		202	95	754	3
	2,5	-3,6	765	7,	1.4 2.	7.100	<b>F</b> 0)	96	25%	75
				1	*					
0	0	2000	220	90.	57		701	25	25.8	76
	50	-3.6	327	2	<i>b</i> /1		63	66	25.8	25
2 0	2.5	3.6	700	121	77		70).	00)	258	200
	2.5	-3.0	795	.21	),'d		XO7	10	258	82
	5,5	-3,0	857	72,	86 5/	8.30(	601	701	759	22
					161101	43-2	2.626			
OFHI FORM 18										

	PR	ELIMINARY SURVE (Stack G		NO. 1	,V S.
BASE Show At	=B	PLANT RIQUII	30		
DATE ALAG	a	SAMPLING TEAM	<u> </u>		
SOURCE TYPE AND MAK	E	₹lo	am Borles		
SOURCE NUMBER		INSIDE STACK DIAMET	ER COLOR		ř. ab a a
RELATED CAPACITY		10.14	TYPE FUEL		Inches
DISTANCE FROM OUTSID	,	SIDE DIAMETER	<u> </u>		
NUMBER OF TRAVESSES	, Ø	NUMBER OF POINTS/TI	RAVERSE		Inches
		CATION OF SAMPLING	POINTS ALONG TRA	AVERSE	
POINT	PERCENT OF DIAMETER	DISTANCE F INSIDE WA (Inches	LL	TOTAL DISTANCE FROM OF NIPPLE TO SAMPL (Inches)	N OUTSIDE ING POINT
1		, 5		,5	
2.		1-0		1.0	
3		1.9		1,9	
4		3. 2		3.2	
5		6.8		6.8	
6		8,1		8,1	
7		9.00		9.0	
Я		9.5		9.5	

## PRELIMINARY SURVEY DATA SHEET NO. 2 (Velocity and Temperature Traverse) DATE BASE INSIDE STACK DIAMETER Inches In Hg STACK STATIC PRESSURE In H20 SAMPLING TEAM STACK TEMPERATURE (0F) VELOCITY HEAD, Vp IN H20 TRAVERSE POINT NUMBER $\alpha$ AVERAGE

	AIR POLI	LUTION PA	RTICUL	ATE ANA	LYTICAL	. DATA			
Show Building Number		18 I	Ang :	SOURCE NU		RUN NUMBER			
#113	3¢				MBER				
1.	ITEM	<del></del>	PARTICU FINAL WE	EIGHT	INIT	IAL WEIGHT		EIGHT PARTICLES	
FILTER NUMBER			( <b>&amp;</b> an)			(gm) 		( <b>@</b> m)	
ACETONE WASHINGS Hall Filter)	i (Probe, Front								
BACK HALF (If neede	ed)								
				ight of Partic	ulates Call	ected		<b>ģ</b> m	
11.		<del></del>	WATE		INIT	IAL WEIGHT	T -	WEIGHT WATER	
1	TEM		(gm)		INI	(gm)		(gm)	
IMPINGER 1 (H20)			238 204.	ζØ,	2	00,0		38.Ø	
IMPINGER 2 (H20)		6	204.	0	20	0.0		38. Ø 4. Ø	
IMPINGER 3 (Dry)					· <del></del>			;	
IMPINGER 4 (Silica Ga	o1)		206	,\	20			6.1	
			Total Wei	ight of Water	Collected		48,1 ***		
Ш,	ANAL VEIE		GASES	(Dry)	vele	ANALYSIS			
ITEM	ANALYSIS 1	ANALY	'S15	470	3	4		AVERAGE	
VOL % CO2									
VOL % 0 <sub>2</sub>									
VOL % CO					***************************************				
VOL % N <sub>2</sub>									
		Vel % H2 = (1	100% - % (	o <sub>2</sub> .	% CO)				

#### **APPENDIX J**

Building 1200, Steam Boilers 1, 2 and 3 Field Data

ONS  PF + 460	Co Tr. VP HEATER BOX TEMP	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Cp 84 sq ft DRY GAS FRACTION (Fd)	GAS METER TEN	VOLUME (OF) (OF) (OF)	85 477.954 18 78 2.32 68	8,5	1,9	85 2	812.412 96 87 341	2	1,00 1	11 85 90 238 72 15 98 938 72		92 23	15/9/L 513- 27:079		
PARTICULATE RATIO OF STACK CHOSS SECTION	51de 1200 Sulfied	SKUW Nurred Nurred	METER BOX NUMBER $ \frac{75}{75} = 369.1 $ $ \frac{7}{7m} = 89.4 $ $ \frac{7}{4} = 1.37 $	SE SAMPLING STATIC STACK TEMP VELCCITY	(in H20) (oF) (oF) (OR) (V)	W 2 2.0 173 672 1	2.0 390 1.	7 60	15 2.5	2 7.5	7.9	3 7.0 200 5 7.0 3.38	2.4 402	15 25 427	2.5 436			FORM

		YEY DATA SHEET NO. 2 Cemperature Traverse)	
BASE Shaw		DATE 12 Aug	88
BOILER NUMBER	BLDG 12	i dod	· .
INSIDE STACK DIAMETER 9.63		,	Inches
STATION PRESSURE 29.945			In Hg
STACK STATIC PRESSURE -,046	<u> </u>		In H20
SAMPLING TEAM	·		
TRAVERSE POINT NUMBER	VELOCITY HEAD, Vp IN H20	or CHACHONIE	STACK TEMPERATURE (OF)
!	.06	1.	176
	.07	Ø	275
3	. 09	3	342
4	.12	2	428
5	, B	2	432
6	.13	φ	430
7	اله ال		434
8	- 110	Φ	404
		MG= 1.0°	
		-	
·		-	
		<u> </u>	
	AVERAGE		

	AIR POLI	UTIC	ON PARTICUL	ATE ANA	LYTICAL	DATA			
BASE		DATE		<del> </del>		RUN NUMBER			
SHOW AFT	3	12	AUG-85	~		/			
BUILD'AG NUMBER			Ţ	SOURCE NU					
BLDG 120	00		1	BOIL	FRO	¥ <b>1</b>			
l			PARTICU		1				
	ITEM		FINAL WE		INITI	AL WEIGHT	WEIGH	IT PARTICLES (gm)	
FILTER NUMBER									
ACETONE WASHIN Hall Filter)	GS (Probe, Front								
BACK HALF (If nee	eded)								
			Total We	ight of Partic	ulates Colle	ected		គួបា	
11.			WAT	ER					
	ITEM		FINAL W		INIT	AL WEIGHT	WE	IGHT WATER	
IMPINGER 1 (H20)			246.	U	20	0	4	16,0	
IMPINGER 2 (H20)			206		20	0		, 0	
IMPINGER 3 (Dry)			1.1		(	2	1./		
IMPINGER 4 (Silica	Gel)		205.8		20	0	5	8	
	***	-	<u> </u>	lght of Water	Collected		58.9		
111.	ANALYSIS	T	GASES ANALYSIS	7	LYSIS	ANALYSIS			
ITEM	1	<del>  </del>	2	1	3	4		AVERAGE	
VOL 5 CO2	6.8		6-8	6.	-8			6.8	
۷٥L ٦ ٥ <sub>2</sub>	11,4	/	11.4	1/.	4		/	1.4	
VOL 5 CO									
VOL 5 N2									
		Vol	% N2 = (100% - %	CO2. % O2.	. % CO)	<u> </u>			

OEHL FORM 20

SHEET	SO STATION PRESS	. 1	soluthed at (5 - 1/2) C(x PROBELENGTH	E C	βδ. (2) (2) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	DRY GAS FRACTION (Fd)	SAMPLE IN AVG OUT TEMP SAMPLE IMPINGER SAMPLE IN AVG OUT TEMP TEMP (OF) (OF) (OF) (OF) (OF)	10 116 114 257	254	122 110 200 68	300	177 150 250 1.8	123 124 25%	12/2/201		12 12 120 60	82 712 126, 122, 256 68	FP= 25, 322		
PARTICULATE SAMPLING DATA	CROSS SECTION EQUATIONS $^{\circ}R = ^{\circ}F + 460$	H = [513		<b>1</b> 111	4.6228		(Ts) HEAD PRESS. (OR) (H) (H)	6.015 1.20 1.075 1.30	7.03			11/0/10	0.15	100 - 100 -	9.61 0700	0.00	6.42 1.15	- war	,	
	Vert 2 SCHEMATIC OF STACK CROSS SECTION		3	1 = 266,2 1 = 266,2	Th= 121.4 AH: 1.57	RIS : PETER	STATIC STACK TE PRESSURE (OF)	2,0 /69	30 276	7.6 305	277	291 9.7	2,00 194		30	+	25 33			
	DATE ONE BOTLENA 2	12 Am 83	BASE SAUPLE BOX NUMBER	BOX NE	mo/wo	3	TRAVERSE SAMPLING POINT TIME NUMBER (BID)	102	2		-	0	2	30		2/2	8 2			CEMI FORM 10

\_

### PRELIMINARY SURVEY DATA SHEET NO. 2 (Velocity and Temperature Traverse) DATE Bldg 1200 INSIDE STACK DIAMETER Inches STATION PRESSURE In Hg In H20 SAMPLING TEAM √ Vp TRAVERSE POINT NUMBER VELOCITY HEAD, Vp IN H20 STACK TEMPERATURE (0F) AVERAGE

OEHL FORM 16

	AIR POL	LUTION	1 PARTICU	LATE ANA	LYTICAL	DATA		
BASE		DATE	<del></del>		F	RUN NUMBER		
SITIXU AFE	}	12	AUG-8	18		/		
BUILDING NUMBER		L		SOURCE NU			<del></del>	
BLDG 12	00			BOIL	FR F	72		
I.		<del></del>	PARTIC	ULATES		<del></del>	· · · · ·	
1	TEM		FINAL V	WEIGHT m)	INITI	AL WEIGHT	w	EIGHT PARTICLES
FILTER NUMBER								
ACETONE WASHINGS Hall Filter)	(Probe, Front							
BACK HALF (If needs	ed)							
			Total W	Veight of Partic	:ulates Colle	ıcted		. ga
11.		·····	WA.	TER	,		<del></del>	
	TEM		FINAL V		INITI	AL WEIGHT		WEIGHT WATER
IMPINGER 1 (H20)			26	2	2	00		62.0
IMPINGER 2 (H20)			20€	5	2	00		6-0
IMPINGER 3 (Dry)			0.	5	(	0.0	(	0.5
IMPINGER 4 (Silica G	el)		206.	.06.5 200			6.5	
			Total V	Weight of Water	Collected			75.0 m
111.	T			S (Dry)		T		
ITEM	ANALYSIS 1		ANALYSIS 2	ANA	L YSIS 3	ANALYSIS 4		AVERAGE
VOL % CO2								
۷٥L % ٥ <sub>2</sub>								
VOL % CO								
VOL % N2								
	<u> </u>	Val % [	≥- + (100% - ¹	% CO2 . % O2 .	- <b>&amp;</b> CO)			

					PART	PARTICILI ATE SA	SAMPLING DATA SHEET	SHEET					1
										A	AMBIENT TEN	4	
	RUN NUMBER		SCHEMA	SCHEMATIC OF STACK CROSS	K CROSS S	SECTION (SDF)	EQUATIONS						(
	Do(161	五 Oil	Oil me		. 4	L)&1	$^{\circ}R = ^{\circ}F + 460$	0		15	STATION PRE	55	O.F.
	DATE					13 26	L	5	,		290	929	in Ma
	=	and an					н = 5130		T. Vp	Ī	HEATER BOX TEMP	TEMP	£
	F. A. ( )	17000	1	{	13	7-1848	<b>.</b>	٦-	! !				90
	BASE	7	S.	P D		Stack Die (50)= 9/8 in	Max 3			<u>ā</u>	ROBE HEAT	PROBE HEATER SETTING	
	O PINER ROX WINBER	3 3 3		1	7		Pread che	Pread cheek of 18 in 115	_	ā	PROBE LENGTH	H.	
							,				72	\	u.
	METER BOX NUMBER	ABER	1				APS OBTAIN	DPS OBTAINE WITH DEITKIMP DIETTINGE.	¥ (¥)	Ž	NOZZLE ARE	AREA (A)	
			••	781.6								20	ıj bs
	Qw/Qm		1 E	107.5						<u></u>	h8'	ק	
	<b>ರ</b>		0 = do	0.00	1818 t	8.1510				<u> </u>	DRY GAS FRA	GAS FRACTION (Fd)	
				STACK TEMP		> 100 iux	ORIFICE	GAS	GAS METER	ETER TEMP		SAMPLE	IMPINGER
	TRAVERSE	SAMPLING	VPRESSURE		(Te)	HEAD	DIFF.	SAMPLE	z	-	OUT	BOX	OUTLET
1		(G1.E)	(0ZH PM)	(oF)	(0R)	(Vp)	PRESS. (H)	(cu ft)	(oF)	(Tm) (oR) (o		(oF)	(oF)
05		0	2.5	180		Ø.08	[7]	772,856	99	96	1	747	12/2
	74.	۲	3.0	200		11-12	1.5		[0]	900	200	637	6/
	r	3	30	725		3E110	1.66		104	1	2	3	65.
	2	6	3,6	307		6.17	2.2		801	41		7.7	100
	~	7/	3,0	346		31.0	2.3.		2	0)	00	24.3	13
	,	15	2,6	34/		60'0	1,2	_	011	2)	70(	744	20
	2	81	3.46	785		11 P	3.	9		7	102	244	77
	a	21	Ø/ <b>T</b>	319		6,63	4,	786,125	109	2/	50	244	83
. 0.									, K			7	Do
	1 8	0	7.6	17/		Ó	7		107	77	106	749	22
•	2	2	220	200		7	169		1 1011	77	196	4,50	200
	3	e		047		9	1,1		$+ \frac{z_{i} t_{i}}{t_{i}} +$	57	200	000	16
	5	24	2,7	48/		7/2	1.7		12		20	100%	11
	7	15	11.	200		グラグ	1-		8)			84%	11
	31	26	100	127		300	/0//		170	1	2	100	116
	0	2,7	2,10	300		60.0	77,	748.310	3		(5)	2019	2.5
	0	5	***				\ \ \ \ \ \						
									6,3				
					,		•	これられ	+				
				SAMPLING ENTE =	CONTE = C	2,5 5 HCFM	-+						
. •	OEM FORM	91	And in comment of the	-	Comments of the Comments		المرقيدة والترويدة والإمامية						

	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		
,	PREL	IMINARY SURVEY DATA S (Stack Geometry)	SHEET NO. 1
BASE Shaw	PL	ANT BLDG 1200 IPLING TEAM	
II Au	488 SAM	IPLING TEAM	
SOURCE TYRE AND MAK	7200- 12	BOILER#3	
SOURCE NUMBER	INS	BOILER#3  IDE STACK DIAMETER  95 (9.63)	Inches
RELATED CAPACITY	<u> </u>	TYPE FUE	:L
DISTANCE FROM OUTSID		E DIAMETER	
NUMBER OF TRAVERSE		MBER OF POINTS/TRAVERSE	Inches
2	LOCAT	TION OF SAMPLING POINTS ALC	ONG TRAVERSE
POINT	PERCENT OF DIAMETER	DISTANCE FROM INSIDE WALL (Inches)	TOTAL DISTANCE FROM OUTSIDE OF NIPPLE TO SAMPLING POINT (Inches)
1		,5	3.9
2		1.0	4.4
3		1.9	5.3
4		3.1	6.5
5		6.5	9.9
6		7.8	11.2
7	ř	8.6	12.Ø
8		9.1	12.5
		·	
		,	
		·	

		EY DATA SHEET NO. 2 emperature Traverse)	
BASE		Day 89	·
BOILER NUMBER	BLD6 120	THE OF	
INSIDE STACK DIAMETER	2200 //10		Inches
STATION PRESSURE 29.92	9	· · · · · · · · · · · · · · · · · · ·	
STACK STATIC PRESSURE			In Hg
SAMPLING TEAM	<u> </u>		In H20
TRAVERSE POINT NUMBER	VELOCITY HEAD, Vp IN H20	∠ FreyCIONIE	STACK TEMPERATURE (0F)
	.08	13	185
2	,09	15	205
3	.12	15	237
4	, 135	14	310
5	.150	15	345
6	, 13	14	338
7	,03	. 15	330
8	,01	13	305
		ANG = 14.3	·
			·
			•
	AVERAGE .		

	AIR POLLU	TION	PARTICUL	ATE ANA	LYTICAL	DATA		
BASE	.)	TE	16 1	- 68		RUN NUMBER		
BUILDING NUMBER	<u> </u>		11 Aug	OURCE NU	MBER	NC		
12-4	50				oiler	#3		Oil Firel
ī.			PARTICUL			AL WEIGHT	T	EIGHT PARTICLES
	TEM	$\perp$	FINAL WE (gm)		(NITI	AL WEIGHT (gen)		(gm)
FILTER NUMBER								
ACETONE WASHINGS Hall Pilter)	(Probe, Front							
BACK HALF (It neede	d)							
			Total Wei	ght of Partic	culates Calle	ered		gm
П.			WATE				1	
1,	TEM		FINAL WE	IGHT	INIT	AL WEIGHT		WEIGHT WATER
IMPINGER I (H20)			289.	5	2	60,0		89.5
IMPINGER 2 (H20)			169.	<b>Ø</b>	2	00,0		-31.0
IMPINGER 3 (Dry)			1,	6		Ø		1.6
IMPINGER 4 (SIIIca Ge	)))		206.2			00.0g		6.2
***	Ť		Total Weight of Water Collected			#	66.3 28.3 m	
III.			GASES					
ITEM	ANALYSIS 1		NALYSIS	ANA	L YSIS 3	ANALYSIS		AVERAGE
VOL % GO <sub>2</sub>		<u>.</u> .						
VOL % 02								
VOL % CO								
VOL % N <sub>2</sub>								
	•	/ol % I	N <sub>2</sub> = (100% - % (	CO <sub>2</sub> - % O <sub>2</sub> .	% CO)			

### **APPENDIX K**

**Building 1206, Steam Boiler Field Data** 

				PARTI	PARTICILI ATE CAL	CAMPING DATA SHEET	CHET		-		
RUN NUMBER		SCHEMA	SCHEMATIC OF STACK CROSS SECTION	K CROSS SE		EQUATIONS		-	AMBIENT TEMP	TEMP	
DATE		(3		•	(	$^{\circ}R = ^{\circ}F + 460$	0		STATION DOCCO	25	do
$\bar{N}$	Ang 88	~	(		017/10		2	Ę	,	29.846	o H
PLANT R	0,716/				(18+ID)		Co	Ts. Vp	HEATER BOX T	BOX TEMP	a
NASE ALL	750	Ψ.	9			Preleuhu	ul and	15in 1hg	PROBE	PROBE HEATER SETTING	
SAMPLE BOX NUMBER	UMBER	114	238.1	le		Postleri	Postleri cheek god at 7in 8	at 7 in the	PROBE LENGTH	-ENGTH	
METER BOX NUMBER	WBER ZECH	1/2	98.25					>	NOZZLE	, -	uı ,
.1		14	1.25				•		ζ	<b>\</b>	sq ft
3		Ps.75 =	= 3.1900	9					DRY GAS	DRY GAS FRACTION (Fd)	
TRAVERSE	SAMPLING	N. V. V.	STACK TEMP	EMP	VELOCITY	ORIFICE	GAS	GAS METER	TEMP	SAMPLE	IMPINGER
POINT	TIME (min)	# (2)	(oF)	(Ts) (oR)	HEAD (Vp)	DIFF. PRESS.	SAMPLE VOLUME	N AVG	OUT	BOX TEMP	OUTLET
- (	0	3.5	10		10	0.	851.965	1	99	234	<b>1</b>
70	2	3.20	200		D.	91		101	1001	242	66
7	96	4,0	238	+	10.	نج		107	1000	100	64
٧.	17	4.0	289		707	1.5		601	00)	7.47	65
76	λ 2	7.6	298	+	70	1,5		105	10)	247	26
85	17	2.5	303		jó,	7.7	864.922	107	191	24.9	220
13	0	3.6	100		2	9,		92	4)	7.35	07)
7	e	200	185		0,	7.1		76	92		85
42	20	4,50	276	+	75	1.5		26	97	243	É.É.
2	12	7	286	+	102	1,5		9 5	42	745	200
9	15	4,5	<u>2</u> ∦0		ره.	5')		bb	76	24.5	200
7	30	400	7,850		5)	1,0	14	06	94	245	89
D		*	7027	+	2	۸٬ ۱	1	7.1	7	245	99
						16131	43.25.63	9			
					-						
DEHL FORM	18				¥						

	PRE	LIMINARY SURVEY DATA (Stack Geometry		
BASE		PLANT		
SI HAW ITB		AMPLING TEAM		
DATE		AMPLING TEAM		
15 AUG 88 SOURCE TYPE AND MAKE				
SOURCE TYPE AND MAKE	<del></del>			
OIL -FI KED 130	LER			
SOURCE NUMBER		NSIDE STACK DIAMETER		·····
	1	13友(1	3.88 in)	Inches
RELATED CAPACITY			FUEL	
DISTANCE FROM OUTSID				
NUMBER OF TRAVERSES	(3	4 MIPO()		Inches
NUMBER OF TRAVERSES				
	2	8		
	LOC	ATION OF SAMPLING POINTS	ALONG TRAVERSE	
		DISTANCE FROM	TOTAL DISTANCE FROM O	HTSIDE
POINT	PERCENT OF DIAMETER	INSIDE WALL (Inches)	OF NIPPLE TO SAMPLING (Inches)	POINT
		.5	3.8	
2		1.5	4.7	
3		2,7	5,9	
4		4.5	7.7	
5		94	12-6	
6		11 2	14.4	
7		17 4	15.7	
Q		12,1	16.6	<del></del>
O		13.4	10,0	
	•			
·	······································			
	<del></del>		•	

		YEY DATA SHEET NO. 2 emperature Traverse)	
BASE		DATE	<del></del>
SHAW AFIS	BLDG /206	15 466 88	
Oil- Apea B	BLDG 1206 Blig 1206 (one boiler	only tested	
13.880	n	<i>U</i>	Inches
STATION PRESSURE 27.84	' ආ		In Hg
STACK STATIC PRESSURE	<del></del>		In H20
SAMPLING TEAM			m n20
TRAVERSE POINT NUMBER	VELOCITY HEAD, Vp IN H20	√ Vp	STACK TEMPERATURE (OF)
		0	
2		0	
3		0	
4	.02	6	
5	.02	1	
6		0	
77			
8		0	
	AVERAGE		

	AIR POLL	JTIC	N PARTICUL	ATE ANA!	LYTICAL	DATA		
Show Af	13, SC	ATE O		82		RUN NUMBER		
BUILDING NUMBER	F1206		•	0/L/-11	RED BO	ルたに		
l.			PARTICUL	LATES				
ľ	TEM		FINAL WE (gm)	IGHT	INITI	AL WEIGHT (gm)	*	EIGHT PARTICLES
FILTER NUMBER								
ACETONE WASHINGS Half Filter)	(Probe, Front							
BACK HALF (if needs	od)			,				
			Total Wei	ght of Partic	ulates Colle	ec te d		€m
11.			WATE	R			,	
	TEM		FINAL WE	IGHT	INIT	AL WEIGHT		WEIGHT WATER
IMPINGER 1 (H20)			253.4	<b>†</b>	2	00 mcs		53.4
IMPINGER 2 (H20)			205		а	00 mC		5
IMPINGER 3 (Dry)	_		In	_		$\bigcirc$		
IMPINGER 4 (SIIIca O	PINGER 4 (Silica Oel)		206 gras		200gras			6
-	<b>~</b>	•	Tatal Wei	ght of Water	Collected		6	5.4
III.			GASES	(Dry)				
ITEM	ANALYSIS 1		ANALYSIS 2	ANAL	YSIS 3	ANALYSIS		AVERAGE
VOL % CO <sub>2</sub>			<del></del>				;	
VOL % 02								
VOL % CO					_: <del>_</del> : <del>_</del> :			
VOL % N2								
		Vol 9	i N <sub>2</sub> = (100% - % (	CO2 · % O2 ·	% CO)			

### **APPENDIX L**

Building 1402, Hot Water Boiler Field Data

					PART	CULATE	SAMPLING DATA SHEET	A SHEET					
S N	RUN NUMBER		SCHEM	SCHEMATIC OF STACK CROSS S	CK CROSS'S	ECTION	EQUATIONS			AMBIE	AMBIENT TEMP		
1					- b .		$^{\circ}R = ^{\circ}F + 460$	90		STATI	STATION PRESS	40	
<u> </u>	17 1	88	<b>万</b>	大學	7			_	<u>.</u>	29.	1.850	or He	
PLAN		3 3	<b>,</b>				==	Co	Ts. Vp	٠	HEATER BOX TEMP		T
BASE		3	2041	٦	2002	3		, A	(0, 70)		PROBE HEATER SETTING	4o	
	N S S S S S S S S S S S S S S S S S S S	2 FFR		) ⊄		•	1505 1505 1505 1505 1505 1505 1505 1505	Tarum Done	الشكالم				
SAME	PLE BOX NUI	UMBER					1471 6				PROBE LENGTH		<del></del>
METE	METER BOX NUMBER	MBER	~ 	REETE	2 Berley		1 400	Meaning 34C	•		NOZZLE AREA (A)	01	<del></del>
`	NCT	EL	12.	255.1			(A) 20.	A received to	3		12/	ıj bs	T
<u>}</u>	Ę,		IK I	Tin: 88.4			= 9/97 V	A many But, Works Dro	z A		)\$S.		
3			PSTS = 4	- 4.353,	35				)		DRY GAS FRACTION (Fd)	d)	
11	TRAVERSE POINT NUMBER	SAMPLING TIME (@in)	TESSUBE ESSUB ESSUBE ES		STACK TEMP  (Ts) (OR)	VELOCITY HEAD (Vp)	ORIFICE DIFF. PRESS.	GAS SAMPLE VOLUME	GAS METER TEMP	ER TEMP	SAMPLE BOX TEMP	IMPINGER OUTLET TEMP	
	_	0	-2,5	4		0	(E) 7,	946.880	+-	(S) (SF)	246	200	
	7	٧	-2.5	162		, Ø3	٦//		צמ	8	243	32	i
	~	0)	-2.5	127		3	h. 1		87	200	241	9	
	7		C7-	404		70.	7,7	1217866	7,	92	24.2	23	
		0	-2.5	217		.03	b')		94	89	243	89	
	2	5	-2.5	231		103	h'!		92	90	244	39	
	67	0/2	-25	267		100	7	170 010	99	21	767	80	7
	-		67-	0)7		1		10171915	7777	1	7 7	623	_
		TOTH	TIME ?	39 min	302	1	Tarm	25 = 22	,30rl				
		(801	54 STE	(man)									T
													$\top$
													_
													-
													<del>                                      </del>
													-
OEHL	HL FORM	18	describer describer					The state of the s	er e				7

	PF	RELIMINARY SURV (Stack	'EY DATA SI Geometry)	HEET NO. 1	
BASE Show A	FB	Blda	: NCO	club BLD6	1402
DATE 17 Ava 8	8	SAMPLING TEAM			
	red hea	ting boils	1		
SOURCE NUMBER		INSIDE STACK DIAME	5		Inches
RELATED CAPACITY			TYPE FUE	· <b>L</b>	
	1.25 (3	NUMBER OF POINTS	/		Inches
NUMBER OF TRAVERSES		4			
	LC	CATION OF SAMPLIN	G POINTS ALO	ING TRAVERSE	
POINT	PERCENT OF DIAMETER	DISTANCE INSIDE ( (Inch	WALL	TOTAL DISTANCE FR OF NIPPLE TO SAMP (Inches)	
		φ.7		4.2	
2		2.7		6,2	
3		8.1		11.6	
4		10.1		13.5	
					<del></del>
					<del></del>
				·	

		'EY DATA SHEET NO. 2 emperature Traverse)	
Shew		DATE 17 Aug. 88	
	. 1- 1- 1	17 mt 88 VCO club B4	
I INSIDE STACK DIAMETER	1	VCO Club 134	100 1406
STATION PRESSURE	15 1	· · · · · · · · · · · · · · · · · · ·	Inches
A DI STACK STATIC PRESSURE			In Hg
9 29.850			In H20
SAMPLING TEAM			
TRAVERSE POINT NUMBER	VELOCITY HEAD, Vp IN H20	2 cijewnic	STACK TEMPERATURE (0F)
1		12_	
2		12	
3		17	
4		12	
		ANG = 120	
	AVERAGE		

. ..

	AIR POLL	UTIC	ON PARTICUL	ATE ANA	LYTICAL	DATA		
BASE	_	DATE	,	QQ		RUN NUMBER		
SHAW A	FB, SC		17 Aus	80				
BUILDING NUMBER 13	LDG 1407 0	Α	T	SOURCE NU	MBER			<del></del>
BX	NCO Ulu	b						
1.			PARTICU	LATES	·	<del></del>		
ı	TEM		FINAL WE		INIT	IAL WEIGHT	"	(em)
FILTER NUMBER		_		·				
ACETONE WASHINGS Half Filter)	(Probe, Front							
BACK HALF (If neede	d)							
			Total Wei	ght of Partic	ulates Calle	ected		<b>£</b> m
11.			WATE	R	т			
1'	TEM		FINAL WE	IGHT	INIT	AL WEIGHT	<u> </u>	WEIGHT WATER
IMPINGER 1 (H20)			767.	0	2	0.00		62.0
IMPINGER 2 (H20)			184.	O	2	6.00		- 16.0
IMPINGER 3 (Dry)			Ø			Ø		Ø
IMPINGER 4 (SIIIca Gel)			205.6		2	Ø0.0		5.6
			Total Weight of Water Collected		6	51.6 am		
111.			GASES	(Dry)		1		1
ITEM	ANALYSIS 1		ANALYSIS 2	ANAI	_YSIS 3	ANALYSIS 4		AVERAGE
VOL % CO2								
VOL % O2								
VOL % CO								
VOL % N <sub>2</sub>								
		7 1eV	N2 = (100% - % (	CO <sub>2</sub> - % O <sub>2</sub> -	% CO)			

# APPENDIX M Building 1422, Hot Water Boiler Field Data

OF   H =   S130.   OR   F   OR   OR					PART	ICULATE	SAMPLING DATA	SHEET				
3	RUN NUMBER		SCHEM	ATIC OF STA	CK CROSS SI	CTION	EQUATIONS			AMBIE	MEMP	
BY ALCO 1922   State Backgraph   The State							OR = OF + 46	0		į	<u>C</u>	90 F
SAV BLOE 1921	ر ج	ଷ୍	<del></del>			i L		۲	ſ	20	ION PRESS	:
		20				1	*	•		HEAT		30 m
SVEAL)  REAK NUMBER  REAK NUMBER  REAK NUMBER  FINE 241.6 F  FINE 243.9  FINE 243.9  FINE STACK TEMP  FINE (ann)  FINE CANADATE  FINE (ann)  FINE CANADATE		BLD6 14	72			18 t	J	י		0	4	
Columbia   Fig. 241.6   Fig.	•	<b>પ</b>				111					ב שבאו כא אבו וו	2
SAMPLING   \$\overline{F}_{\text{in}} = \overline{F}_{\text{in}} = \overli	SAMPLE BOX NO	JMBER		S)	١					PROB	E LENGTH	
NUTECO   Fine 19.9   NUTECO	RB	J	75.	241.6 /	u.							ui
Co	METER BOX NU	MBER	17 <sub>€</sub>	93.9						ZZON	1	
17.5   17.5   17.3   3   3   3   3   3   3   3   3   3	- 1	7		7.1						ď		sq II
PANSENSE	,		74	•	ſ						48	
SAMPLING STATIC STACK TEMP VELOCITY ORIFICE SAMPLE IN AVG. OUT BOX (GEN)	3		1/515:		<b>Y</b> )	. —				DRY	AS FRACTION (FC	G
THE PRESSURE (OF) (OF) (OF) OFFS. SAMPLE IN (NO) OFF (OF) OFFS (OFF) (OFF) OFFS (OFF) OF	TRAVERSE	SAMPLING	STATIC	STACK	TEMP	VELOCITY	ORIFICE	GAS	GAS ME		SAMPLE	IMPINGER
15	POINT	TIME (Bin)	PRESSURE (ia H20)	( <i>o</i> F)	(Ts) (°R)	HEAD (Vp)	PRESS.	SAMPLE VOLUME			BOX TEMP	OUTLET TEMP (OF)
1.5	-	0	12.5	101		,0	h.7	13	_		247	68
50 -2.5 125	2	7.5		185		<u>،</u> هر	7		70	101	245	63
125   225   246   102   114   104   101   104   101   104   101   104   101   104   101   104   101   104   102   104   102   104   102   104   103   104   103   104   104   105   105   104   105   105   104   105	3	5.0	-2.5	1.55			h		103	10(	744	89
10.0 = 1.5 245	7	7.5	4	360		.02	4,7		501	101	hb2	68
15.0	5	0,0	-4.5	750	1	63	7,7		107	10)	747	68
115 - 2.5 283	91	277	12	350		102	<b>y</b> -   -		02/0	189	197	23
2.5 -2.5 165	6	17.5	5,60	1080		500	17	7 2	25	<del>(M)</del>	101	
2.5								173				3
25 -2.5 235 .01 1.4 85 87 236 .01 7.4 85 84 236 .02 4 85 84 740 22 22 4 85 84 740 22	-	0	۱۰,	165		101	ל'	1980367	84	L	232	89
7.5 -1.5 249 02 1.4 85 84 740 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2	5.5	7	235		10	9 1		\$\$	83	236	95
10.4 -7.5 2.13 .03 1.4 886 84 74( 6.5 17.5 2.1.87) 860 840 74( 6.5 17.5 2.1.87) 860 840 74( 6	7	ر ا	67-	7.4%		70,	1		8.5	he a	øn2	60
15.4 -1.5 2.17 .03 (1.4 86 84 7.46 6 15.4 -1.5 2.14 .03 (1.4 84 3.24 6 1.1 8.4 6 2.24 6 1.1 8.4 6 2.4 6 1.1 8.4 6 2.4 6 1.1 8.4 6 2.4 6 1.1 8.4 6 2.4 6 1.1 8.4 6 2.4 6 1.1 8.4 6 2.4 6 1.1 8.4 6 1.	- 1	7	-26-		+	100	0,1		100	7,0	125	69
15.3 -2.5 274 .03 1.4 AN 374 86 84 259 6 17.3 -2.5 279 .02 1.4 AN 374 86 84 74/	1		7,			40	17.7		a co	1/3	777	8
17.5 - 1.5 274 202 1.4 PP1. 374 84 54 721 6 10.403 84 721 1.4	2 0	6 21	212	1/10		(0,1	-P.		200	23	227	610
10.403	a	\$\frac{1}{2}	1	553		100	7,7	11/1/100	000	200	227	0 /
7570L. 5-3 <u>-</u>				1		107	7	10.403	*	a	72	90
7570L G-5-								1 1				
							10191	7				
										-		

	PR	ELIMINARY SURV	EY DATA SHE! Geometry)	ET NO. 1	•
BASE		PLANT TO V	<u> </u>	· · · ·	<del></del>
DATE Shaw		SAMPLING TEAM	BLDG 11	422	
	.88			•	-01 on R A
SOURCE TYPE AND MAK	01)-20	2 P_21-	Flame Div	Inc. Parsons &	9045D
SOURCE NUMBER	0,, (2,7	INSIDE STACK DIAME		INC. 100 BY 45 N	30PS Emorpre
RELATED CAPACITY		17.5	TYPE FUEL		Inches
			oil	17-30 grlpa	h
DISTANCE FROM OUTSID	20.5in	SIDE DIAMETER		Ú I	Inches
NUMBER OF TRAVERSES	, JO. J. W.	NUMBER OF POINTS	TRAVERSE		200,00
2	1.0	CATION OF SAMPLING	POINTS ALONG	TOAVEDSE	
				TOTAL DISTANCE FROM	OUTSIDE
POINT	PERCENT OF DIAMETER	INSIDE W	ALL	OF NIPPLE TO SAMPLIN (In chee)	G POINT
1		16		3.6	
2		1-8	3	4.8	
3		3,4	ł	6.4	······································
4		5-	7	8.7	
5		11.	8	14-8	
6		14		17.1	
7		15	.7	18.7	
8		16	9	19.9	
				·	
					·

		'EY DATA SHEET NO. 2 emperature Traverse)	
BASE		DATE	
SITAW		17 AUG 88	
BOILER NUMBER  R X BL	106 1422		
INSIDE STACK DIAMETER			Inches
17.5 .			
29.50 STACK STATIC PRESSURE			In Hg
-,0/			In H20
SAMPLING TEAM			
TRAVERSE POINT NUMBER	VELOCITY HEAD, Vp IN H20	X crychonic	STACK TEMPERATURE (0F)
11		10	
2		10	
3		10	
4		5	
5		5	
6		10	
7		10	
8		12	
		AVG = 90	
			·
	AVERAGE		

	AIR POLL	.UTIC	ON PARTICUL	ATE ANA	LYTICAL	DATA		
BASE		DATE				RUN NUMBER		
SITAW A	HF17	1	17 AUG 8	8				
BUILDING NUMBER		-		SOURCE NU	MBER			
BX	BL16 /L	127	,					
1.		·	PARTICU	LATES	····			
1'	ТЕМ		FINAL WE		INIT	(gm)	<b>w</b>	EIGHT PARTICLES (gm)
FILTER NUMBER								
ACETONE WASHINGS Hall Filter)	(Probe, Front							
BACK HALF (II neede	d)							
				ight of Partic	ulates Colle	ected		g m
11.			WATI		1	- <u>-</u>	<del></del>	
1'	TEM		FINAL WE (gen)		INITI	AL WEIGHT		WEIGHT WATER
IMPINGER 1 (H20)			276.	0	Ĺ	0.00		76.0
IMPINGER 2 (H20)			184.	0	×	0.00	-	-16.0
IMPINGER 3 (Dry)	IMPINGER 3 (Dry)		Ø			Ø		Ø
IMPINGER 4 (SIIIca Gel)		8.000		2	200.0		6.8	
			Total Weight of Water Collected			(	66.8	
111.			GASES (Dry)			Y		
ITEM	ANALYSIS		ANALYSIS 2	ANAI	LYSIS 3	ANALYSIS 4		AVERAGE
VOL % CO <sub>Z</sub>								
VOL % 02								
VOL % CO								
VOL % N <sub>2</sub>					-			
		V+1 9	6 N2 = (100% - %	CO <sub>2</sub> - % O <sub>2</sub> .	* CO.			

## APPENDIX N Steam Boiler Field Data

PLANT   LO AND 88 PLANT   PLANT   PLANT   BASE   SAMPLE BOX NUMBER   PE 3	Perbuiler	SCHEMA	TANK CALL	SCHEMATIC OF STACK CROSS SECTION	L. WILLIAM				HAMA	AMBIEN - LINE	
Oilhird - WE DATE 16 HWY PLANT BIDG 160 BASE SAMPLE BOX NUMBE	स्रोधनर्टा १९६	_	, , , , , , , , , , , , , , , , , , , ,		בוכא	EQUATIONS				3	
PLANT 10 AVE BLAG 160 BASE SANDLE BOX NUMBE	र ठ	\{\begin{align*} \text{\left} \text{\left} \text{\left}	Paralle	\ \ \ \ \		$^{\circ}R = ^{\circ}F + 460$	_		STAT	STATION PRESS	30
PLANT BASE SAMPLE BOX NUMBE	\ \ \ \	1					72			29.80%	H
BIRG 160 BASE SAMPLE BOX NUMBE	750	9	<b>②</b>	_ >_		Н = 130	S130-FG-CP-A	Ts. Vp	HEAT	HEATER BOX TEMP	-
BASE SAMPLE BOX NUMBE	<u> </u>		d A	2	ر ال	1	7				do
SAMPLE BOX NUMBE					<					PROBE HEATER SETTING	<b>့</b>
SAMPLE BOX NUMBE		VELOCI	VELOCITY AP'S TOKEN WI	DKEN WI	114 13	٠	1 0.0	7	1) )	a Ford Cook	
	ď	NY TIVE	DE MICHELS PITOT ASSEMBLY	1- ASE 13	BAY	Tre les	t sugar about	30180	MUN PHONE	E LENGTH	
		300	ACISMI THOMS OF BLICK	. 1751DE	STACK	Dort	Can Land	子にな		7	EI
METER BOX NUMBER	ar.	AMENTA	DIMMETER (7.5") SAMPLE WAS	) SHM	x E wys	10/2/		, <i>O</i>	NOZZLE	LE AREA CANTO	,
		TAKKN	AT CENTA	STODIA	THERN AT CENTROID OF STACK AND	2 1/6/ 25/	٠١.		ئ	3	11 bs
Ow/On		PARHM	esters m	NIDOR	PARHMETERS MONITORAD BYCS MIN	In: 107:	2			181	
3		SHEET NO.2	1765. AI	J. NOVE	APS NOIRE OF LIMIT	PSR= 8.8	4 8,84/6		DRY	GAS FRACTION (Fd)	6
-			STACK TEMP	TEMP	VELOCITY		GAS	GAS METER	ETER TEMP	SAMPLE	IMPINGER
POINT POINT	TIME	28 S. A.	(0F)	(Ts)	HEAD (Vp)	PRESS.	SAMPLE		Ave Our	BOX TEMP	TEMP
- }						Œ	dad AAA	200	1	200	8/
A	) C	2,7-	17.7			77	*****	107	79/	750	(2)
7	6.7	7,0	九			7		103	102	75.00	(26
7	7,5	2,5	*			2		104	201	7	E
4	2	-25	144		.15	7,1		104	701	253	65
7-9	- C	-7.5	160		. (5	1,4		105	103	25"	65
7	15.0	-15	12			h'1		901	(3)	250	63
8	175	-1.5	166			7.7	935.425	107	HOJ	250	oc
								1001	12/	202	700
B -	9,	-2.5	367			77		000	10/	1	67
74	١,,	2.5	136			7 -		30/	104	241	61,2
-	2,5	2.5	152			1.1		80)	104	244	44
V	10.0	2.7.	143		A 100 F	7.		<i>[9;</i>	10	249	40
2	12.5	-2.5	147		7	•		107	164	250	67
7	15.3		145			2,1		101	103	249	47
Q	17.5	-25	146			7,1	946.645	107	103	258	87
									·		
						DUK	2813 = 22.	645			

	PRE	LIMINARY SURVE		T NO. 1	
SHAW AFB	P	BLDG /	604		
16 AUG 8 8	5	AMPLING TEAM			
SOURCE TYPE AND MAKE	OULEP CONN	4 BOINER)			
SOURCE TYPE AND MAKE  OIL -FIRED B  SOURCE NUMBER	III	NSIDE STACK DIAMETE	R		
RELATED CAPACITY		7, 3	TYPE FUEL	Inches	
DISTANCE FROM OUTSILE	OF NIPPLE TO INSI	IDE DIAMETER	<del></del>		
NUMBER OF TRAVERSES	NI	UMBER OF POINTS/TR	AVERSE	Inches	
	LOCA	ATION OF SAMPLING	OINTS ALONG T	RAVERSE	
POINT	PERCENT OF DIAMETER	DISTANCE F INSIDE WAI ([Inches]	-L	TOTAL DISTANCE FROM OUTSIDE OF NIPPLE TO SAMPLING POINT (Inches)	
l l		0.5		3,5	
2		0.8		3.8	
3		1.5		4.5	
4		2.4		5,4	
5		5.1		8.1	
6		6.0		9.0	
7		6.7		9.7	
ヹ		7.0		10.0	
,					
				· · · · · · · · · · · · · · · · · · ·	
	. <u></u>				
				· · · · · · · · · · · · · · · · · · ·	
			1		

		YEY DATA SHEET NO. 2 emperature Traverse)	
BASE Shea)		16 Aug 88	
BOILER NUMBER 1604		14 /15-00	
BIN 1604 INSIDE STACK DIAMETER 7.5	51n		Inches
STATION PRESSURE	7.806		In Hg
STACK STATIC PRESSURE			In Hg
SAMPLING TEAM			III TIZV
TRAVERSE POINT NUMBER	VELOCITY HEAD, Vp IN H20	2 ETCYCHONIC	STACK TEMPERATURE (0f)
1	10,09	7	
2	.12 .10	2	
3	.13 .11	Z	<u> </u>
4	.14 .135	2	<u> </u>
5	145 ,145	2	
6	:15 .15	2	ļ
7	.14 .14	2	
8	.13 .13	Ø	
	AP'S THEN WITH	AVG = 2.0	<b></b>
	DETISCHE PITOT.		<u> </u>
·			
!			
		1	
		1	
.1			
	AVERAGE		

ł	AIR POLL	UTION PARTIC	ULATE ANA	LYTICAL	L DATA	
BASE		DATE			RUN NUMBER	
SHAW	AFR	16 Aug	PP			
BUILDING NUMBER	1112	1000	SOURCE NE	JMBER		
168					RED	
100	<del>/                                    </del>	PARTI	CULATES	, , , , , , , , , , , , , , , , , , ,	WED.	
			WEIGHT	TINIT	TIAL WEIGHT	WEIGHT PARTICLES
	ITEM		gen)	<u> </u>	(gm)	(gm)
FILTER NUMBER						
ACETONE WASHING Half Filter)	GS (Probe, Front					
BACK HALF (If nee	rded)					
		Total	Weight of Partle	culates Coll	ected	<b>4</b> m
II.		WA	TER	T	<del></del>	
	ITEM		WEIGHT <del>(211</del> )	INIT	TAL WEIGHT	WEIGHT WATER (&m)
IMPINGER 1 (H20)		24	'4	21	00	44
IMPINGER 2 (H20)		20	6	l .	00	6
IMPINGER 3 (Dry)		1	(	7	1_	
IMPINGER 4 (Silica	IMPINGER 4 (Silica Gel)			70	00	6.2
		Total 1	Weight of Water			57.2 em
11).			ES (Dry)		T	
ITEM	ANALYSIS	ANALYSIS 2		LYSIS 3	ANALYSIS	AVERAGE
VOL % CO2						
VOL % 02						
VOL % CO						
VOL % N <sub>2</sub>						
		Vel % N <sub>2</sub> ± (100% - 1	% CO <sub>2</sub> . % O <sub>2</sub> .	% CO)		

### **APPENDIX** O

Building 1614, Steam Boiler Field Data

##   BOLIGH   STREAM OF STREET ON ST					PARTICL	JLATE SAM	PARTICULATE SAMPLING DATA SHEET	SHEET					
Name	Bole to the plant of the plant	0 3		Though the taking	de de la	2 x x x x x x x x x x x x x x x x x x x	"R = "F + 46  H = [5130  Pre (ex.)c.  Tim = 107.  Tis = 272  Zit = 1.4  PSTS = 4.6	hed yould be so	17 . vp (5/5) (5/5) (4/5)	PROJ PROJ PROJ PROJ DRY	STATION PRESS  29.806  HEATER BOX TEMP PROBE LENGTH  72  NOZZLE AREA (M)  Cp  SF4  DRY GAS FRACTION (Fd)	oF OF IN Hg A CLO	
2 5 -2.5 127	TRAVERSE POINT NUMBER	SAMPLING TIME (min)	FATA STATE OF THE	1 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	20	ELOCITY HEAD (Vp) (Vp)	ORIFICE DIFF. PRESS. (#)	GAS SAMPLE VOLUME (cu.ft) 100, 165	GAS MI IN (°F) 102 102 110	AVG OUT (TM) (OR) (OR) (OR) (OR) (OR) (OR) (OR) (OR	SAMPLE BOX TEMP (9F) 269 250 250	IMPINGER OUF) OF) C &	1 1 1 1 1
			ا ا ا ا ا ا ا	227 284 3445		070.07.04	<del>  </del> 7727	- 1	2 C C C C C C C C C C C C C C C C C C C	90 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	252 2532 2533	25.50	

	PRELI	MINARY SURVEY DATA (Stack Geometry)		
BASE	PLA			
SITAW AF	B	BLDG-1614 PLING TEAM		
DATE	SAME	LING TEAM		
SITAW AF DATE 16 AVG 88 SOURCE TYPE AND MAK				
SOURCE TYPE AND MAK	E			
CIL FIRED P	DILER # /	DE STACK DIAMETER		
#/	1431	16	fa-b	
RELATED CAPACITY		70 TYPE FI	Inches UEL	
DISTANCE FROM OUTSID	E OF NIPPLE TO INSIDE	DIAMETER		
			Inches	
NUMBER OF TRAVERSE	NUM	BER OF POINTS/TRAVERSE		
		<u> </u>		
	LOCATI	ON OF SAMPLING POINTS A	LONG TRAVERSE	
POINT	PERCENT OF DIAMETER	DISTANCE FROM INSIDE WALL (Inches)	TOTAL DISTANCE FROM OUTSIDE OF NIPPLE TO SAMPLING POINT (Inches)	
1		1.1	4.1	
2		4.0	7.0	
3		12.0	15.0	
4		14.9	17.9	
				,

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Mark Control

		EY DATA SHEET NO. 2 emperature Traverse)	<del></del>
BASE		DATE	<i>C</i> .
Shaw BOILER NUMBER		16 Hug 8	8
	La 1614	O	
INSIDE STACK DIAMETER	0		Inches
STATION PRESSURE 29.80	06	· · · · · · · · · · · · · · · · · · ·	In Hg
STACK STATIC PRESSURE			In H20
SAMPLING TEAM		· · · · · · · · · · · · · · · · · · ·	
TRAVERSE POINT NUMBER	VELOCITY HEAD, Vp IN H20	d. BCYCLONIC	STACK TEMPERATURE (OF
		5	
2		5	
3		5	
4		5	
		AVG = 5°	
			Sing 1
<del></del>			
			•
		· · · · · · · · · · · · · · · · · · ·	
	AVERAGE		

AIR PULLUTION PARTICULATE ANALT TICAL DATA						
SHAW AFB		16 Aug 8	6 Aug 88		RUN NUMBER	
BUILDING NUMBER		BOILER # 1				
I. PARTICULATES						
ITEM			FINAL WEIGHT		AL WEIGHT (gm)	WEIGHT PARTICLES
FILTER NUMBER		·				
ACETONE WASHINGS (Probe, Front Hall Filter)						
BACK HALF (if needed)						
		Total We	Total Weight of Particulates Collected			<b>j</b> m
II. WATE						
ITEM		FINAL WE	FINAL WEIGHT		AL WEIGHT (gm)	WEIGHT WATER (#m)
IMPINGER 1 (H20)		<b>A</b> 00 34	<b>po</b> 244.0		∞, O	44.0
IMPINGER 2 (H20)		207,	207,0		0,00	7.0
IMPINGER 3 (Dry)		Ø	Ø			· Ø
IMPINGER 4 (SIIIce Gel)		206.	206.7		00.0	6.7
		Total We	Total Weight of Water Co			57.7
III. GASES (Dry)						
ITEM	ANALYSIS 1	ANALYSIS 2		_YSIS 3	ANALYSIS 4	AVERAGE
VOL % CO2						
VOL % O2						
VOL % CO						
VOL % N <sub>2</sub>						
Vol % N2 = (100% - % CO2 - % O2 - % CO)						

				PARTI	CULATE SAN	PARTICULATE SAMPLING DATA SHEET	SHEET				
PLANT BLOG 1614 BASE  \$\int \text{AMU BFB} \text{SAMPLE BOX NUMBER} \text{ROX NUMBER} \text{ROX NUMBER} \text{AMV BFB} \text{CO} \text{CO} \text{CO}	DATE  16 AUG & 8  PLANT  BLOG 1614, BOILÚR HZ  BASE  \$ THALL BFB  \$ AUPLE BOX NUMBER  R. PC  WETER BOX NUMBER  AUTRC  CO  CO	<u></u>	SCHEMATIC OF STACK CROSS SECTION  S. R. P. P. M.  F. 15.5 P. Whiny  F. 15.5 P. Whiny  T. W. Wan,	Per 19 Charles SE Co 19 Charles SE Co 19 Charles SE Charles Se 14 Charles SE	2	EQUATIONS  OR = OF +460  H = \begin{array}{c} \$5130.Fd.Cp.A \\ \$C_0 \end{array}  \overline{\mathcal{F}} \cdot 260.3 \\ \overline{\mathcal{F}} \sqrt{\overline{\mathcal{F}}} \cdot \overline{\mathcal{F}} \cdot \m	\$ 24 A	2. Tm. Vp (67. Hq	STATIO HEATE PROBE NOZZL Cp	STATION PRESS  29 866  HEATER BOX TEMP PROBE HEATER SETTING PROBE LENGTA  72  NOZZLE AREA (M) (A)  CP  SY  DRY GAS FRACTION (Fd)	oF oF in
TRAVERSE POINT NUMBER	SAMPLING TIME (min)	PRESIDENCE PRESIDENCE PRESIDENCE PRESIDENCE PRESIDENCE PROPERTY PR	(oF) (TS) (OF) (OF) (OF) (OF) (OF) (OF) (OF) (OF	(Ts) (0R)	VELOCITY HEAD (VP) O446 O446 O446	ORIFICE DIFF. PRESS. (H)	GAS SAMPLE VOLUME (22. ft) \$77.84¢	GAS METER IN (ATM) (OF) (OF) (OR)	OUT OUT	SAMPLE BOX TEMP (°F) 235 235 235	IMPINGER OUTLET TEMP (OF)
-n-+	oसव <u>र</u>	-25 -25 -25 -25 -25	136 278 319		, 0255 , 0466 , 0460	2., 1 2., 1	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	93 93 100 100 100	\$\$ 6 P	740 743 743 743	6,26
OEHL FORM	, at										

OEHL FORM 18

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		Pf	RELIMINAR	Y SURVE (Stack G		SHEET NO. 1	
	SHAW AF	: B	BLE BLE	DG 16	,14		
	16 AUG 8		SAMPLING T	EAM			
	SOURCE TYPE AND MAK	E	± 7				
	OIL FIRED I	13010-111	#Z INSIDE STAG	CK DIAMET	ER		Inches
	RELATED CAPACITY		<u> </u>		TYPE F	JEL	Ettnes
	DISTANCE FROM OUTSID	(NIPPLE = 3			RAVERSE		Inches
-			CATION OF	4 SAMPI ING	POINTS AI	LONG TRAYERSE	
	POINT	PERCENT O DIAMETER	F C	ISTANCE I INSIDE WA (Inches	ROM	TOTAL DISTANCE FROM OF NIPPLE TO SAMP (Inches)	OM OUTSIDE LING POINT
	1			1.1		4.1	
41	2			4.0		7,0	
15.0	3			12.0		157.0	
17:9	4			14.9		17.9	
	OCH FORM 15						

OEHL FORM 15

		EY DATA SHEET NO. 2 emperature Traverse)	
BASE SIMPLY A.F.O.		16 DATE 88	
SIMW AFB		10 101/12 - 1	
BLOG 1614 B	OILER#2		
STATION PRESSURE			Inches
29,806 stack static pressure			In Hg
STACK STATIC PRESSURE			In H20
SAMPLING TEAM			
TRAVERSE POINT NUMBER	VELOCITY HEAD, Vp IN H20	∝ Forcyclonic	STACK TEMPERATURE (OF)
		10	
2		10	
3		19	
4		ΙΨ	······································
		AVG = 10°	
		,	
	AVERAGE		

	AIR POL	LUTIO	ON PARTICUI	LATE ANA	LYTICAL	DATA		
BASE		DATE			T	RUN NUMBER		
SHAW AFB		16	AUG 89	<u>~</u>				
BUILDING NUMBER				SOURCE NU	MBER			
1614				BOIL	ER #	. 2.		
1.			PARTIC		0(2)			· <del></del>
	TEM	-	FINAL W	EIGHT	INIT	AL WEIGHT	W	EIGHT PARTICLES
			(617)	)		(gm)	—	( <b>ý</b> m)
FILTER NUMBER								
ACETONE WASHINGS Hall Filter)	(Probe, Front							
BACK HALF (II neede	rd)							
			Tatal We	eight of Partic	culates Call	octed		<u>g</u> an
11.			WAT		1		т—	<del></del>
1	TEM		FINAL W		INIT	AL WEIGHT (gen)		WEIGHT WATER
IMPINGER 1 <i>(H20)</i>			238	>, 0	2	0,0		38.0
IMPINGER 2 (H20)			209,	0	20	0,00		9,0
IMFINGER 3 (Day)			Ø			Ø		Ø
IMPINGER 4 (Silica G	o1)	_	205,	3	20	0,00		5.3
			Total We	ight of Water	Callected		5	72.3
111.		<del></del>	GASES	(Dry)				,
ITEM	ANALYSIS		ANALYSIS 2	ANAL	YSIS 3	ANALYSIS		AVERAGE
VOL % CO2								
VOL % 02								
VOL % CO								
VOL % N <sub>2</sub>								
	<del></del>	V•1 %	i H <sub>2</sub> = (100% - %	co2.%02.	% CO)			

**APPENDIX P** 

Calibration Data

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## METER BOX CALIBRATION DATA AND CALCULATION FORM

(English units)

Date 12 Jul 88

Meter box number 2010 NUSECH

Barometric pressure,  $P_b = \frac{29.119}{100}$  in. Hg Calibrated by  $\frac{1}{100} = \frac{1}{100} =$ 

		Gas v	olume	T	emperati	ure				
Val	Orifice manometer setting (ΔΗ), in. H <sub>2</sub> O	Wet test meter (V <sub>U</sub> ), ft <sup>3</sup>	Dry gas meter (V <sub>d</sub> ), ft <sup>3</sup>	Wet test meter (t <sub>y</sub> ), of/R	Dry Inlet (t <sub>d</sub> ), i °F//?		er Avg (t <sub>d</sub> ),	Time (θ), min	Yi	ΔΗ@ in. H <sub>2</sub> O
ات علی	0.5	5	4.668	78 538	83 539.5	78 536,5	538	13,1	1.070	2.010
4	1.0	5	4.670	<sup>78</sup> 538	89 546.5	78 81 539.5	543	9.3	1.078	2.008
4	1.5	10	9.390	78 53 <b>8</b>	90 96 553	82 544	548,5	15.5	1.082	2.070
ч	2.0	10	9.455	79 80 539.5		87 905485	553.5	13,5	1.070	2.087
4	3.0	10	9.470	80 81 540.5	L	90 93551.5	557.5	11.1	1.081	2.109
4	4.0	10.l	9.590	81 541	109567.5	96 555	561,3	9.8	1.082	2.138
-				<del></del>			·	Avg	1.077	2.070

ΔH, in. H <sub>2</sub> O	<u>ΔΗ</u> 13.6	$Y_{i} = \frac{V_{w} P_{b}(t_{d} + 460)}{V_{d}(P_{b} + \frac{\Delta H}{13.6}) (t_{w} + 460)}$	$\Delta H\theta_{i} = \frac{0.0317 \Delta H}{P_{b} (t_{d} + 460)} \left[ \frac{(t_{w} + 460) \theta}{V_{w}} \right]^{2}$
0.5	0.0368	4, = (4.668 X21.119+ 25.5) (538)	He, = (29,119)(538) [(538)(13,1)]
1.0	0.0737	(5)(29,119)(543) 42: (4.67)(29.119+ 1/3.6)(538)	Hez= (10317)(1) [(538)(413)] 2
1.5	0.110	(10)(29.119)(546.5)	He3= (29.119 (5485) [ (538)(15.5)]
2.0	0.147	(10×29,119×553.5)	(.0317)(2.0) [(539.5)7L
3.0	0.221	(10)(29,119 X 557,5) 45=(7.47)(29.119+3/36)(540,5)	Hes= (.0317)(3) [(540.5)(111)]
4.0	0.294	(10.1)(29.119)(561.3) 56-(9.59)(29.119+4/13.6)(541)	Heb= (10317)(4) [(541)(710)]2

 $<sup>^{\</sup>rm a}$  If there is only one thermometer on the dry gas meter, record the temperature under  $t_{\rm d}$  .

## METER BOX CALIBRATION DATA AND CALCULATION FORM

(English units)

Date 12 Jul 88Meter box number RACBarometric pressure,  $P_b = 29.131$  in. Hg Calibrated by  $FAGIN \in SCOTT$  R = 64425

			<u> </u>							<u> </u>
		Gas v	olume	T	emperati	ure				
Vaga	Orifice manometer setting (\Delta H), in H2O	Wet test meter (V <sub>y</sub> ), ft <sup>3</sup>	Dry gas meter (V <sub>d</sub> ), ft <sup>3</sup>	Wet test meter (t,),	Inlet (t <sub>d</sub> ),	Ras met Outlet (t d o	Avg" (t <sub>d</sub> ),	Time (θ), min	Y	ДН0 in. H <mark>1</mark> 0
4	0.5	5	4.712	77 537.5	101557.5	7 <b>6</b> 7 <b>5 5</b> 37	548,25	12.0	1.081	1.652
4	1.0	5,2	4,940	77 78 537.5	104566.5	71	552.75	_	1.080	1.666
4	1.5	10	9.6pp	78 18 538	113572	81 84 542.5	551.25		1.075	1.908
4	2.0	10	9.529	18 19 538.5	116 575.5	85 812 545.5	560,5	13.Q	1.087	1.903
4	3.0	10	9.636	79 539	1265785	87 547.5	563.Ø	18.6	1.076	1.893
4	4.0	10	9-605	79 539	12258	88 5485	564.75	9.1	1.080	1.391
-					-		•	Avg	1.080	1.736

ΔH, in. H <sub>2</sub> O	<u>ΔΗ</u> 13.6	$V_{d}^{(P_b + \frac{13.6}{13.6})}$ (tw + 460)	$\Delta H\theta_{i} = \frac{0.0317 \ \Delta H}{P_{b} (t_{d} + 460)} \left[ \frac{(t_{w} + 460) \ \theta}{V_{w}} \right]^{2}$
0.5	0.0368	71 - (4.112)(27.1317 7/3.6)(231.3)	HO, = 129.131/548.25) (537.5)(12.0) ]
1.0	0.0737	(5.2 \ 29.131 \ 5.5 \ 2.75\ y= = \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Hez = (29.131)(552.75) [(537.5) 2.9]
1.5	0.110	13 = 79.6 (29.131) (557.25)	$\sqrt{29.131} = \frac{(0.017)(5)}{(29.131)(55).25} = \frac{(538)(5)}{10}$
2.0	0.147	10×29.131×560.5)	1/4 4 = 139.131)(560.5) [(538.5)(13)]2
3.0	0.221	$\frac{(10)(29.13)(563)}{(9.636)(29.13) + \frac{3}{1} + \frac{3}{1}$	1/2 (20317 X3) [(539 X10.6)]2
4.0	0.294	10X29.131X564.75)	(106 = (C.0317)3) [(S31/91)]2

 $<sup>^{\</sup>rm a}$  If there is only one thermometer on the dry gas meter, record the temperature under  $t_{\rm d}$  .

Quality Assurance Handbook M4-2.3A (front side)

# POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

E(Cls 8 785+	Plant Acces AFB) PRE SHAW	Pretest Y 1.077	Y.	1	$V_{\rm w} P_{\rm b} (t_{\rm d} + 460)$	V, (P, + AH \/t + 460)	d ( b 13.6/( w )	-10.0 1.072 10829.76 X542.25	14 (10×29:74) 544) 15535	4 100 29 76 15 16 15 15 15 15 15 15 15 15 15 15 15 15 15	College 147 101 12 100 111
ish units)	Plar	1			-	vacuum ri	in. Hg	10.0	-20,04 1.074	-20.4 1.074 100323	11/1
ORM (Engl		er NOTE				(θ), se			╄	-	1
POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)	Meter box number	Jry gas meter number NOTECH	a	ory gas meter	Outlet Average	(, P <sub>1</sub> ) (, P <sub>1</sub> )	9FOL F	19 53,5 542,75 12.2	30日 12.7	20,00	
TER CALIBE	í	60in. Hg Dry	Temperature		Inlet	(,d,)	2 STY	#. 25.	15. F. T.	5 88 549,82	
Y GAS ME	Date 9 Ay 88	73.7		s Wet test		,	\$ 1.	7 534	79 539	3 73 539.	
TTEST DR	ost-one	sure, P <sub>b</sub> =	Gas volume	Dry gas	meter	( E + +	-	9,327	9.336	9,368	
POS	Test number Post-one	Barometric pressure, $P_{ m b}$ = ,	Gas	Wet test	meter	, e	;	10	10	10	
	Test	Barom	Orifice	manometer	setting,	in. H <sub>2</sub> 0		2.5	2.5	2.5	

If there is only one thermometer on the dry gas meter, record the temperature under  ${f t}_{f d}$ 

 $V_{\rm w}$  = Gas volume passing through the wet test meter, ft<sup>3</sup>.

 $V_d = Gas$  volume passing through the dry gas meter, ft<sup>3</sup>.

= 1.0232 -> 1.1309

BSTY KANGE: PRETEST Y 20.05Y

Y = 1.073

= Temperature of the gas in the wet test meter,  $^{\circ}F$ .

= Temperature of the inlet gas of the dry gas meter, oF.

= Temperature of the outlet gas of the dry gas meter, oF.

 $t_d$  = Average temperature of the gas in the dry gas meter, obtained by the average of  $t_d$ , and  $t_d$ , °F.

 $\Delta M$  = Pressure differential across orifice, in.  $H_20$ .

= Ratio of accuracy of wet test meter to dry gas meter for each run.

= Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest  $Y \neq 0.05Y$ .

= Barometric pressure, in. Hg.

 $\theta$  = Time of calibration run, min.

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units) E.elson (1854) Pretest Y 1.080 Test number # 1 Date 9 Aug 88 Meter box number

Barometric pressure, P<sub>b</sub> = 39.760 in. Hg Dry gas meter number **RAC** 

2 : 5 : 0		7	E	•						
OFFICE	DAS VOLUME	o r mue	11	lemperature	ย		_			
manometer	Wet test	Dry gas	Wet test		Dry gas meter	ter				٦.
setting,	meter	meter	meter	Inlet C	utlet	nlet Outlet Average				V P. (t. + 460)
· 图	<u>.</u>	(^,)	(t)	(t, ), (t, ),	٠,	(t,),	Time	Vacuum	<b>&gt;</b>	, o
in. H,0	£*3	£ d3	> \\ 0	0		i d	(6)	setting,	<u>'</u>	V. /P. + AH //t + 460)
7	7.7	7.	A. K	\$ \$	15 P.	. %	min	in. Hg		d (b 13.6)(w
1		17.0	19.7	11 (200)	6000			7		(195 X 92'57)(D)
1.2	٥٢	1,40	<b>36</b> 5.00.5	134 26.78	127.00 r	561.6	111.44	2000	1.097	34 3K-3(2,137.7) 561.6 111.44 20 11.097 (9.401) 29.76 +25/34 YSUGA
2 1	10	2 V V	V 47 / 26	1 20 S	3ेवाटर	1 2015 83 ALCE   C71 G 111 A7	16711	x /	770	C10 X 24, 76 X 577.5
77		4	7 2 2 7	36-77-87		7:17		10101	1011	(9.576)(29.76+2.5//3.615%5)
ング	01	0 10 707 6	アーフッパ	こくなべる	15x2x	さんなくないないというないに			/ / /	(30 X 29.76 X 578.75)
73		0,0	7	こうりょ	1///	1010		20,0	101.1	20,02 11.17.17.37.57.57.57.57.57.17.17.17.15.15.15.15.15.15.15.15.15.15.15.15.15.

 $^{
m a}$  If there is only one thermometer on the dry gas meter, record the temperature under t $_{
m d}$ 

 $v_{\rm w}=$  Gas volume passing through the wet test meter, ft<sup>3</sup>.

 $V_d = Gas$  volume passing through the dry gas meter, ft<sup>3</sup>.

= 1.026 -> 1.134

BSTY RANGE = PRETESTYIY

 $t_{\rm w}$  = Temperature of the gas in the wet test meter,  $^{
m o}F$ .

 $t_d = Temperature of the inlet gas of the dry gas meter, <math>^{9}F$ .

= Temperature of the outlet gas of the dry gas meter, °F.

 $t_d=Average$  temperature of the gas in the dry gas meter, obtained by the average of  $t_d$  and  $t_d$  ,  $^oF$ .

 $\Delta M = Pressure differential across orifice, in. <math>H_2O$ .

 $Y_i$  = Ratio of accuracy of wet test meter to dry gus moter for each run.

Y= Average ratio of accuracy of wet test meter to dry gns meter for all three runs; tolerance = pretest  $Y \pm 0.05 Y$ .

 $P_b = Barometric pressure, in. Hg.$ 

 $\theta = \text{Time of calibration run, min.}$ 

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Plant Post Shows Me G. Anss Pretest Y / 077 Date 6 Sept 38 Neter box number Nufech Barometric pressure,  $P_b = 24.170$  in. Hg Dry gas meter number Test number ONE

Orifice	Gas volume	) lume	Te	emperature					Y;
manometer	Wet test	Dry gas	Wet test	Dry gas meter	meter				•
setting,	meter	meter	meter	Inlet Outlet Average	t Average		<del></del>		V; P; (t, + 460)
(MV)	( <u>v</u>	(5)		$(t, \cdot), (t, \cdot)$	(t.).4	Time	Vacuum	χ.	3
in. H <sub>0</sub> 0	( e	( P)		, p_, , p_,	י לף.	(0)	setting,	<b>-</b>	V4 (Pr + AH )/t., + 460)
7	T T	11	Ť	oF oF		min	in. Hg		d ( b 13.6)( w )
			1	83 78	80.3				(10) 24,171 54D
7.5	10	9.202	n 537	74 75	81.554 12.75	12.75	20.0	1.088	(9.202) 29.17+22 (537)
2.5	10	9.308	13 437	87 84.	805425 12.24	12.24	20, W	1.679	10 20 (17 5) (17 5) (17 5) (17 5)
2.5	10	9.500	1,537	35 25	845547,15 12.20	12.20	200	1.059	(9)(24)(17)(42) Ed (15)(1)
								Y = I, Q	175

 $^{
m a}$  If there is only one thermometer on the dry gas meter, record the temperature under t $_{
m d}$ 

where

 $V_{\rm w}=$  Gas volume passing through the wet test meter, ft.

 $V_d$  = Gas volume passing through the dry gas meter, ft $^3$ .

= 1.0232 -> 1.1307

POST Y RHNGE - PURTEST X # DUSY

 $_{W}^{+}$  = Temperature of the gas in the wet test meter,  $^{\circ}$ F.

= Temperature of the inlet gas of the dry gas meter, °F.

 $_{\rm d}$  = Temperature of the outlet gas of the dry gas meter,  $^{
m oF}$ .

= Average temperature of the gas in the dry gas meter, obtained by the average of  $t_d$  and  $t_d$ , of.

 $\Delta H$  = Pressure differential across orifice, in.  $H_2O$ .

= Ratio of accuracy of wet test meter to dry gas meter for each run.

= Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest  $Y \pm 0.05 X$ .

, = Barometric pressure, in. Hg.

 $\theta$  = Time of calibration run, min.

## POSTTEST DRY GAS METER CALIBRATION DATA FORM (English units)

Test	Test number 0	one D	Date 6 Sup 198	1	leter bo	Meter box number Natel	N	rch	Plant P	Plant Post Shaw Me Graffigs
Baron	Barometric pressure, $P_b = 24.17\phi$ in	ure, $P_b = 2$	19.17¢ in.	. Hg Dry	gas me	Dry gas meter number	3:		Pretest	Pretest Y / Ø77
Orifice	Gas volume	olume	Te	Temperature	ē					Y
manometer	Wet test	Dry gas	Wet test		Dry gas meter	ter				, rt
setting,	meter	meter	meter	Inlet Outlet Average	utlet	Average				V P, (t, + 460)
(₩)		(°,2)	(ئو),	(t, ), (t, ), (t, ),	t, ', '	(t,),	Time	Vacuum	Υ.	р, д ж
in. H <sub>2</sub> 0	fr.3	ft.3	0 ₹ \r	;~	 -°	o c	(0)	setting,	 	$V_{A}/P_{L} + \Delta H / t_{L} + 460$
			•	οF	οF	4	min	in. Hg		13.6/\ w \ \ 13.6/\ w
ί,	•	700		83 78	<b>5</b>	80.5	100	_		(10)\24,17\(541)
7.7	ρŢ	7.00%	4.402 11551	74 75		8,554 12.25 28.0	12.72		- <b>68</b> 8	1.088 (9.202) 29.17.2.2 Y 5.37)
2.5	10	9.308 17.	17527	74. 80		31.5 5425 12.24	12.24		1.679	(a) 73. (1) (24.2.5)
75	10	9 5.40	1, 427	3. 3.	640	8. 6. C. J. J. C. J.	200	i i	1 160	(0)(29,17/543.75)
		JW W	1/7/11	/8	2	はっしている	14.70		このロー	このリーはものとによったことのです

 $^{f a}$  If there is only one thermometer on the dry gas meter, record the temperature under t $_{f d}$ 

= 1.0232 -> 1.1309 105T Y CHNOR - PORTHST X # 0.65 X  $\mathbf{v}_{\mathbf{v}}$  = Gas volume passing through the wet test meter, ft<sup>3</sup>.  $V_d$  = Gas volume passing through the dry gas meter, ft<sup>3</sup>.

= Temperature of the gas in the wet test meter, OF.

= Temperature of the inlet gas of the dry gas meter,  $^{o}\mathrm{F}$ .

= Temperature of the outlet gas of the dry gas meter,  $^{\mathrm{o}}\mathrm{F}$ .

 $t_d$  = Average temperature of the gas in the dry gas meter, obtained by the average of  $t_d$  and  $t_d$ , of  $\Delta H = Pressure differential across orifice, in. H<sub>2</sub>0.$ 

 $Y_i$  = Ratio of accuracy of wet test meter to dry gus meter for each run.

Y = Average ratio of accuracy of wet test meter to dry gas meter for all three runs; tolerance = pretest  $Y \pm 0.05 Y$ .

 $P_b = Barometric pressure, in. Hg.$ 

 $\theta$  = Time of calibration run, min.

## **APPENDIX Q**

**Exhaust Gas Moisture Content and Velocity Calculations** 

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* XROM *METH 5*	XRON THETH 5"	XROM TMETH 51
RUN NUMBER	RUN NUMBER	RUN NUMBER
BLDG 403, BOILER 2	BLDG 403, BOILER 3	BLDG 403, BOILER 5
RUN	RUN	RUN
METER BOX Y?	METER BOX Y?	METER BOX Y? 1.0770 RUN
1.9778 RUN	1.0770 RUN	••••
DELTA H?	PELTA H?	DELTA H? 1.4000 RUN
2,0000 RUN	1.9000 RUN	BAR PRESS ?
BAR PRESS ?	BAR PRESS ?	29.6050 PUN
29.8600 RUN	29.8600 RUN	METER VOL ?
METER YOL ? 27.0840 RUH	METER VOL ? 25,8910 RUN	22.9918 PUN
	4	MTR TEMP F?
MTR TEMP F? 128.2000 RUN	MTR TEMP F? 115.3000 RUN	120.7000 RUN
% OTHER GAS	% OTHER GAS	% OTHER GAS
REMOVED BEFORE	REMOVED BEFORE	REMOVED BEFORE
DRY GAS METER ?	DRY GAS METER ?	DRY GAS METER ?
RUN	RUN	RUN
STATIC HOH IN ?	STATIC HOW IN ?	STATIC HOH IN ?
0800 RUN	0800 RUN	0450 RUN
STACK TEMP.	STACK TEMP.	STACK TEMP.
578.9000 RUN	502.5000 RUN	333.8000 RUN
ML. WATER ?	ML. WATER ?	ML. WATER ?
180.5888 RUN	94.2080 RUN	87.4000 RUN
IMP. % HOH = 15.3	IMP. 2 HOH = 14.7	IMP. % HOH = 15.5
106 1 4 1000 - 1010	THE STORY	_
% HOH=15.3	% HOH=14.7	: HOH=15.54
3 11211 2212		
*: 0022	1 . 5 tušš	% O2?
6.9 <b>9</b> 61 RUN	8.0000 RUN	8.0000 RUN
% bxygem?	% OXYGEM?	% OXYGEN? 8.0000 RUN
7.9000 RUN	7.2000 RUN	•••
% CO ?	% CO ?	% CO ?
RUN	RUN	MOL WT OTHER?
MOL WT OTHER?	MOL NT OTHER?	HUE WI OTHER:
RUN	KON ;	1.27
MILA =36 43	MWd =29.57	MWd =29.60
MWd =29.42 MW WET=27.68	MW WET=27.86	MW WET=27.80
門内 毎年(三と(100	HM ME1-21.00	THE COURT
SORT PSTS ?	SQRT PSTS ?	SORT PSTS ?
11.8388 RUK	18.9672 RUN	10.3136 RUN
TIME HIN ?	TIME MIN ?	TIME MIN ?
40.0000 RUN	40.0000 RUN	40.0000 RUN
	NOZZLE DIA ?	DIM
RUN	.5000 RUN	RUN
STK BIA INCH ?	STK DIA INCH ?	STK DIR INCH ? 15.7500 RUN
12.2500 RUN	12.2500 RUH	13.1360 600
UOL HTD OTE 01 010	* VOL MTR STD = 25.660	* YOL NTR STD = 22.355
* VOL MTR STD = 26.260	* YOU MIK SID - 20.000 STK PRES ABS = 29.85	STK PRES ABS = 29.68
STK PRES ABS = 29.85 VOL HOH GAS = 4.73	VOL HOH GAS = 4.43	YOL HOH GRS = 4.11
	% MOISTURE = 14.73	% MOISTURE = 15.54
% MOISTURE = 15.26 MOL DRY GAS = 0.847	MOL DRY GAS = 0.853	MOL DRY GAS = 0.845
% NITROGEN = 85.20	% NITROGEN = 84.80	% HITROGEN = 84.00
MOL WT DRY = 29.42	MOL WT DRY = 29.57	MOL HT DRY = 29.60
MOL WT WET = 27.68	MOL NT WET = 27.86	MOL HT WET = 27.80
VELOCITY FPS = 29.58	VELOCITY FPS = 27.31	VELOCITY FPS = 25.82
STACK AREA = 0.82	STACK AREA = 0.82	STACK AREA = 1.35
STACK ACFM = 1,452.	STACK ACFM = 1.341.	STACK ACFM = 2.096.
* STACK DSCFM = 624.	* STACK DSCFM = 626.	* STACK DSCFM = 1.165.
	153	

RUN HUMBER BLG G11 BOLLER 1  METER BOX Y?  1.4000 RUN  1.4000 RUN  1.4000 RUN  METER BOX Y?  2.4.6050 PUP  METER VOL?  2.2.900 PUP  METER VOL?  2.2.900 PUP  METER VOL?  2.2.900 PUP  MIT TEMP F?  STOTIC HON IN 7  MIL MATER?  MIL MATER?	XROH "HE!	rh 5-	XROM THE	TH 5*	XPOH -MET	rH 5°
BLIGG 922, BOILER 1   BLIGG 922, BOILER 1   RUN	RUN NUMBER		RUN NUMBER	:		
## TETER BOX Y?  1.4988 RUN   1.4989 RUN   1.4988 REFER?   1.4989 RUN   1.4988 REFER?   1.4989 RUN   1.4988 REFER?   1.4988 RUN   1.	BLDG 611, BOILER 1		BLDG 922, HW BOILER			
1.8778   RUN		RUN		RUN i		RUN
1.8778   RUN	METER BOX Y?	}			METER BOX Y?	
BELTA H?   L.4088   RUN   BOR PRESS ?   29.8150   PUN   BOR PRESS ?   22.8150   PUN   ETR YOL ?   22.9060   PUN   22.9060   PUN   22.9060   PUN   23.4446   RUN   PUN	1.0770	RUN	••••	RUN		RUN
### 1.4000 PUN ### 1.	DELTA H?		DELTA H?	}		
BAR PRESS ? 29.6859 PUN METER VOL ? 29.8159 PUN METER VOL ? 29.8159 PUN METER VOL ? 29.6859 PUN METER VOL ? 29.6859 PUN METER VOL ? 30.6860 PUN X OTHER CAS PENOVED BEFORE BRY CAS METER ?  STATIC HOH IN ? -8759 PUN X STATIC HOH IN ? -8759 PUN MIL HATE ? 61.2860 PUN X HH. HATER ? 37.7860 PUN X OXYCEN? 11.8800 PUN X CO2? X CO	1.4000	RUN	1.4009	RUH		RUN
29,6156 PUH  RETER POL?  22,2988 PUH  METER POL?  95,6886 PUH  METER POL?  95,6886 PUH  YOUR TEMP F?  95,6886 PUH  METER POL?  95,6886 PUH  METER POL?  95,7888 PUH  PUH  STATIC HOH HI? 8759 PUH  METER POL?  1.8958 PUH  STATIC HOH HI? 8759 PUH  METER POL?  1.8958 PUH  STATIC HOH HI? 8958 PUH  METER POL?  95,7888 PUH  PUH  METER POL?  95,7888 PUH  PUH  PUH  PUH  METER POL?  11,8888 PUH  MIT TEMP P?  1,877,7888 PUH  MIT TEMP P?  1,0888			BAR PRESS ?			
METER VOL ?   22,2988   PUN   22,9969   RUN   22,9669   RUN   22,3446   RUN   22,3446   RUN   22,3446   RUN   22,3446   RUN   23,4446   RUN   25,7088   RENOVED BEFORE   RUN   25TACK TEMP.   85TACK TEM		RUN	29.8159	RUH		PHN
22,2966			METER VOL ?			1.011
MTR TEMP F?  95,6888 RUN		PIIN		RIJN		DIIN
20   111   9000   20   111   9000   20   20   20   20   20   20				1		KOH
2 OTHER GAS REMOVED BEFORE REMOVED BY STACK BEFOR REMOVED BEFORE REMOVED BY STACK BEFOR RUH STACK BEFOR RUH STACK BEFOR RUH STACK BEFOR RUH STACK BEFO		PHE		RUN		DHIL
REMOVED BEFORE DRY GAS METER?  STATIC HON IN ?						KUN
DRY CAS METER ?   DRY GAS METER ?   RUH   STATIC HOH IN ?						
STATIC HON IN ?		;				
STATIC HON IN ?  -879 PUN  -879 PUN  489.1888 RUN  ML. MATER?  51.2888 RUN  ML. MATER?  161.2888 RUN  161.2888 RUN  161.2888 RUN  161.3	DRT GHS HELEK !	DIR:	BKI GHO HETEK .	DIIU	DRY GAS METER ?	6
THE HIM ?  - 8759 PUN	OTOTIO HON IN O	KUN	CTOTIC HOU IN 3	KUN		KüN
STACK TEMP.   489.1888   RUN   253.6888   RUN   295.5888   RUN   295.5888   RUN   295.5888   RUN   RUN   295.5888   RUN   295.5888   RUN   295.5888   RUN   295.5888   RUN   RUN   295.5888				nu:	STATIC HOH IN ?	
### ### ### ### ### ### ### ### ### ##		BIJN	_	KUN	0200	RUN
## ## ## ## ## ## ## ## ## ## ## ## ##				<b>-</b>	STACK TEMP.	
ML. MATER? 61.2000 RUN 1MP. % HOH = 11.3 1 IMP. % HOH = 7.6 1MP. % HOH = 11.3 2 HOH=7.6 2 HOH=19.9  % CO2? 7,0000 RUN 2 CO2? 11.0000 RUN % CO2? 12.002 % CO2? 12.002 % CO2? 13.0000 RUN % CO2? 14.0000 RUN % CO2? 15.0000 RUN % CO2? 10.0000 RUN	409.1000	RUH		RUN		RUH
The correction of the correc	ML. WATER ?		ML. WATER ?			
THP. 2 HOH = 11.3	61.2000	RUN	39.7000	RUH		RUN
CO27		ı	TMP 2 HOH = 7.6	<del>-</del>		
CO22	IRF. 4 HUR = 11.3	ı	Inr. 4 non - 1.0		INF. 4 NON - 17.7	
CO22	4.11511 44 7		* U0U=7 4	ï	* HOU_10 0	
7.0000 RUN 2 0XYGEN?	1. HOH=11.3		4 nun=7.5		4 HUM=17.7	
7.0000 RUN 2 0XYGEN?					,	
7.0000 RUN 2 0XYGEN?			* 0000		L 0000	
2 OXYGEN? 11.0000 RUN 2 CO ? PUN MOL NT OTHER? PUN MOL NT OTHER? PUN MMG =29.56 MM = 29.56 MM = 29.60 STK DIA INCH? STK PRES RBS = 29.63 VOL HOH GAS = 2.88 VOL HOH GAS = 2.89 VOL		<b>A</b> 1111	•	- 000		DIII
11.0000 RUN   2.00 ?   2.00	7,9888	KUN		KUN		KUN
RUH				5	• • • • • • • • • • • • • • • • • • • •	DIE
NOL NT OTHER?   NOL NT OTHER?   NOL NT OTHER?   NUN		RUN		RUN		KUN
MOL NT OTHER?   MOL NT OTHER?   RUN	% C3 ?		% CO ?		% CO ?	<b></b>
Number   N				RUH (		RUN
### RUN ################################	MOL NT OTHER?	:	MOL NT OTHER?		MOL HT OTHER?	
## NET=28.26 ## NET=28.72 ## NET=27.29    SORT PSTS ?		RUN		RUN		RIJH
## NET=28.26 ## NET=28.72 ## NET=27.29    SORT PSTS ?						
MM MET=28.26  MM MET=28.72  MM MET=27.29  SORT PSTS ?  10.2839 RUN  TIME MIN ?  40.0000 RUN  PUN  STK DIA INCH ?  13.7500 PUN  * VOL MTR STD = 22.660  STK PRES ABS = 29.60  VOL HOH GAS = 2.88  VOL HOH GAS = 2.88  VOL HOH GAS = 2.88  VOL HOH GAS = 1.87  VOL HOT ROT BE STACK AREA = 0.35  STACK AREA = 1.63  STACK AREA = 1.63  STACK AREA = 1.580.  * STACK DSCFM = 843.  * STACK DSCFM = 193.	MWd =29.56		MWd =29.60		MWd =29.60	
SORT PSTS ?  10.2839 RUN  TIME MIN ?  40.0000 RUN  PUN  STK DIA INCH ?  13.7500 PUN  * VOL MTR STD = 22.660  STK PRES ABS = 29.60  STK PRES ABS = 29.81  VOL HOH GAS = 2.88  VOL HOH GAS = 1.87  VOL HOR GAS = 0.887  NITROGEN = 82.00  MOL DRY GAS = 0.887  NITROGEN = 82.00  MOL MT BY = 29.56  STACK AREA = 1.63  STACK AREA = 1.63  STACK AREA = 1.63  STACK ACFM = 1,590.  * STACK BSCFM = 843.  * STACK BSCFM = 49.  * STACK DSCFM = 193.		i	MW WET=28.72		NW WET=27.29	
10.2839 RUN  TIME MIN ?  40.0000 RUN  PUN  TIME MIN ?  RUN  STK DIA INCH ?  13.7500 PUN  * VOL MTR STD = 22.660  * VOL MTR STD = 22.660  STK PRES ABS = 29.60  VOL HOH GAS = 2.88  VOL HOH GAS = 2.88  VOL HOH GAS = 1.87  VOL HOH GAS = 1.29  MOL DRY GAS = 0.887  NOL DRY GAS = 0.887  NOL DRY GAS = 0.887  NOL NITROGEN = 82.00  MOL MT DRY = 29.56  MOL MT DRY = 29.60  MOL MT MET = 28.26  VELOCITY FPS = 3.46  VELOCITY FPS = 11.17  STACK AREA = 1.63  STACK AREA = 0.35  STACK AREA = 0.52  STACK ACFM = 1/580.  * STACK DSCFM = 49.  * STACK DSCFM = 193.	IN ALI EULEU	1			,	
10.2839 RUN  TIME MIN ?  40.0000 RUN  PUN  TIME MIN ?  RUN  STK DIA INCH ?  13.7500 PUN  * VOL MTR STD = 22.660  * VOL MTR STD = 22.660  STK PRES ABS = 29.60  VOL HOH GAS = 2.88  VOL HOH GAS = 2.88  VOL HOH GAS = 1.87  VOL HOH GAS = 1.29  MOL DRY GAS = 0.887  NOL DRY GAS = 0.887  NOL DRY GAS = 0.887  NOL NITROGEN = 82.00  MOL MT DRY = 29.56  MOL MT DRY = 29.60  MOL MT MET = 28.26  VELOCITY FPS = 3.46  VELOCITY FPS = 11.17  STACK AREA = 1.63  STACK AREA = 0.35  STACK AREA = 0.52  STACK ACFM = 1/580.  * STACK DSCFM = 49.  * STACK DSCFM = 193.						
10.2839 RUN  TIME MIN ?  40.0000 RUN  PUN  TIME MIN ?  RUN  STK DIA INCH ?  13.7500 PUN  * VOL MTR STD = 22.660  * VOL MTR STD = 22.660  STK PRES ABS = 29.60  VOL HOH GAS = 2.88  VOL HOH GAS = 2.88  VOL HOH GAS = 1.87  VOL HOH GAS = 1.29  MOL DRY GAS = 0.887  NOL DRY GAS = 0.887  NOL DRY GAS = 0.887  NOL NITROGEN = 82.00  MOL MT DRY = 29.56  MOL MT DRY = 29.60  MOL MT MET = 28.26  VELOCITY FPS = 3.46  VELOCITY FPS = 11.17  STACK AREA = 1.63  STACK AREA = 0.35  STACK AREA = 0.52  STACK ACFM = 1/580.  * STACK DSCFM = 49.  * STACK DSCFM = 193.	SOPT PSTS 2		SORT PSTS 2		SQRT PSTS ?	
TIME MIN ?  40.0000 RUN  40.0000 RUN  40.0000 RUN  80.0000 RUN  9.7500 PUN  9.75		RIIN		RUN		RUN
## PUN ##						
RUN   STK DIA INCH ?   STK PRES ABS = 29.60   PUN   9.7500   PUN   P		DIIN		RUN		PUN
STK DIA INCH ?   9.7500 PUN    * VOL MTR STD = 22.660		NOU		.,		
STK DIA INCH ?       STK DIA INCH ?       STK DIA INCH ?       STK DIA INCH ?         13.7500 PUN       8.0000 PUN       9.7500 PUN         * VOL MTR STD = 22.660       * VOL MTR STD = 22.774       * VOL MTR STD = 23.845         STK PRES ABS = 29.60       STK PRES ABS = 29.81       STK PRES ABS = 29.63         VOL HOH GAS = 2.88       VOL HOH GAS = 1.87       VOL HOH GAS = 5.94         ½ MOISTURE = 11.28       ½ MOISTURE = 7.58       ½ MOISTURE = 19.94         HOL DRY GAS = 0.887       MOL DRY GAS = 0.924       MOL DRY GAS = 0.801         ½ NITROGEN = 82.00       ½ NITROGEN = 84.00       ½ NITROGEN = 84.00         MOL NT DRY = 29.56       MOL MT DRY = 29.60       MOL NT DRY = 29.60         MOL NT DRY = 29.56       MOL MT MET = 28.72       MOL NT DRY = 29.60         MOL NT DRY = 29.50       MOL NT MET = 27.29       VELOCITY FPS = 3.46       VELOCITY FPS = 11.17         STACK AREA = 1.63       STACK AREA = 0.35       STACK AREA = 0.52       STACK AREA = 0.52         STACK ACFM = 1,580       * STACK BSCFM = 72.       * STACK BSCFM = 348.         * STACK BSCFM = 843.       * STACK BSCFM = 49.       * STACK BSCFM = 193.		DHN		DIIN		RHN
## VOL MTR STD = 22.660		KOM		KON		11.5
* VOL MTR STD = 22.660		OHL		DIN		DIIN
STK PRES ABS = 29.60       STK PRES ABS = 29.81       STK PRES ABS = 29.63         VOL HOH GAS = 2.88       VOL HOH GAS = 1.87       VOL HOH GAS = 5.94         ½ MOISTURE = 11.28       ½ MOISTURE = 7.58       ½ MOISTURE = 19.94         MOL DRY GAS = 0.887       MOL DRY GAS = 0.924       MOL DRY GAS = 0.801         ½ NITROGEN = 82.00       ½ NITROGEN = 84.00       ½ NITROGEN = 84.00         MOL NT DRY = 29.56       MOL NT DRY = 29.60       MOL NT DRY = 29.60         MOL NT MET = 28.26       MOL NT MET = 28.72       MOL NT MET = 27.29         VELOCITY FPS = 3.46       VELOCITY FPS = 11.17         STACK AREA = 1.63       STACK AREA = 0.35       STACK AREA = 0.52         STACK ACFM = 1/580       STACK ACFM = 72.       STACK ACFM = 348.         * STACK DSCFM = 843       * STACK DSCFM = 49.       * STACK DSCFM = 193.	13.7500	FUR	0.0000	r.un	7.1300	FUN
STK PRES ABS = 29.60       STK PRES ABS = 29.81       STK PRES ABS = 29.63         VOL HOH GAS = 2.88       VOL HOH GAS = 1.87       VOL HOH GAS = 5.94         ½ MOISTURE = 11.28       ½ MOISTURE = 7.58       ½ MOISTURE = 19.94         MOL DRY GAS = 0.887       MOL DRY GAS = 0.924       MOL DRY GAS = 0.801         ½ NITROGEN = 82.00       ½ NITROGEN = 84.00       ½ NITROGEN = 84.00         MOL NT DRY = 29.56       MOL NT DRY = 29.60       MOL NT DRY = 29.60         MOL NT MET = 28.26       MOL NT MET = 28.72       MOL NT MET = 27.29         VELOCITY FPS = 3.46       VELOCITY FPS = 11.17         STACK AREA = 1.63       STACK AREA = 0.35       STACK AREA = 0.52         STACK ACFM = 1/580       STACK ACFM = 72.       STACK ACFM = 348.         * STACK DSCFM = 843       * STACK DSCFM = 49.       * STACK DSCFM = 193.			+ HAL MED CER = 00	774	. HOL MED CED - 27	0.45
VOL HOH GAS = 2.88       VOL HOH GAS = 1.87       VOL HOH GAS = 5.94         ½ MOISTURE = 11.28       ½ MOISTURE = 7.58       ½ MOISTURE = 19.94         MOL DRY GAS = 0.887       MOL DRY GAS = 0.924       MOL DRY GAS = 0.801         ½ NITROGEN = 82.00       ½ NITROGEN = 84.00       ½ NITROGEN = 84.00         MOL NT DRY = 29.56       MOL NT DRY = 29.60       MOL NT DRY = 29.60         MOL NT HET = 28.26       MOL NT WET = 28.72       MOL NT MET = 27.29         VELOCITY FPS = 25.53       VELOCITY FPS = 3.46       VELOCITY FPS = 11.17         STACK AREA = 1.63       STACK AREA = 0.35       STACK AREA = 0.52         STACK ACFM = 1/580       STACK ACFM = 72       STACK ACFM = 348         * STACK DSCFM = 843       * STACK DSCFM = 49       * STACK DSCFM = 193						
% MOISTURE = 11.28       % MOISTURE = 7.58       % MOISTURE = 19.94         MOL DRY GAS = 0.887       MOL DRY GAS = 0.924       MOL DRY GAS = 0.801         % NITROGEN = 82.00       % NITROGEN = 84.00       % NITROGEN = 84.00         MOL NT DRY = 29.56       MOL NT DRY = 29.60       MOL NT DRY = 29.60         MOL NT WET = 28.26       MOL NT WET = 28.72       MOL NT WET = 27.29         VELOCITY FPS = 25.53       VELOCITY FPS = 3.46       VELOCITY FPS = 11.17         STACK AREA = 1.63       STACK AREA = 0.35       STACK AREA = 0.52         STACK ACFM = 1/580       STACK ACFM = 72       STACK ACFM = 348         * STACK DSCFM = 843       * STACK DSCFM = 49       * STACK DSCFM = 193	=					
MOL DRY GAS = 0.887       MOL DRY GAS = 0.924       MOL DRY GAS = 0.801         ½ NITROGEN = 82.00       ½ NITROGEN = 84.00       ½ NITROGEN = 84.00         MOL NT DRY = 29.56       MOL NT DRY = 29.60       MOL NT DRY = 29.60         MOL NT WET = 28.26       MOL NT MET = 28.72       MOL NT MET = 27.29         VELOCITY FPS = 25.53       VELOCITY FPS = 3.46       VELOCITY FPS = 11.17         STACK AREA = 1.63       STACK AREA = 0.35       STACK AREA = 0.52         STACK ACFM = 1,580       STACK ACFM = 72       STACK ACFM = 348         * STACK DSCFM = 843       * STACK DSCFM = 49       * STACK DSCFM = 193	YOL HOH GAS = 2.89	8				
% NITROGEN = 82.00       % NITROGEN = 84.00       % NITROGEN = 84.00         MOL NT DRY = 29.56       MOL NT DRY = 29.60       MOL NT DRY = 29.60         MOL NT WET = 28.26       MOL NT WET = 28.72       MOL NT WET = 27.29         VELOCITY FPS = 25.53       VELOCITY FPS = 3.46       VELOCITY FPS = 11.17         STACK AREA = 1.63       STACK AREA = 0.35       STACK AREA = 0.52         STACK ACFM = 1,580       STACK ACFM = 72       STACK ACFM = 348         * STACK DSCFM = 843       * STACK DSCFM = 49       * STACK DSCFM = 193	% MOISTURE = 11.29	3				
2 NITROGEN = 82.00       % NITROGEN = 84.00         MOL HT DRY = 29.56       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT DRY = 29.60       MOL HT DRY = 29.60         WELOCITY FPS = 3.46       YELOCITY FPS = 11.17         STACK AREA = 1.63       STACK AREA = 0.35         STACK AREA = 1.57       STACK AREA = 0.52         STACK AREA = 1.63       STACK AREA = 0.52         STACK AREA = 1.63       STACK AREA = 0.52         STACK AREA = 1.63 </td <td>MOL DRY GRS = 0.88</td> <td>87</td> <td></td> <td></td> <td>MOL DRY GAS = 0.8</td> <td>301</td>	MOL DRY GRS = 0.88	87			MOL DRY GAS = 0.8	301
MOL HT DRY = 29.56       MOL HT DRY = 29.60       MOL HT DRY = 29.60         MOL HT HET = 28.26       MOL HT HET = 23.72       MOL HT HET = 27.29         VELOCITY FPS = 25.53       VELOCITY FPS = 3.46       VELOCITY FPS = 11.17         STACK AREA = 1.63       STACK AREA = 0.35       STACK AREA = 0.52         STACK ACFM = 1,580       STACK ACFM = 72       STACK ACFM = 348         * STACK DSCFM = 843       * STACK DSCFM = 49       * STACK DSCFM = 193			% HITROGEN = 84.6	99 i	% NITROGEN = 84.6	90
MOL WT WET = 28.26       MOL WT WET = 28.72       MOL WT WET = 27.29         VELOCITY FPS = 25.53       VELOCITY FPS = 3.46       VELOCITY FPS = 11.17         STACK AREA = 1.63       STACK AREA = 0.35       STACK AREA = 0.52         STACK ACFM = 1/580       STACK ACFM = 72       STACK ACFM = 348         * STACK DSCFM = 843       * STACK DSCFM = 49       * STACK DSCFM = 193			MOL MT DRY = 29.6	5 <b>0</b> '	HOL HT DRY = 29.6	60
VELOCITY FPS = 25.53       VELOCITY FPS = 3.46       VELOCITY FPS = 11.17         STACK AREA = 1.63       STACK AREA = 0.35       STACK AREA = 0.52         STACK ACFM = 1/580       STACK ACFM = 72       STACK ACFM = 348         * STACK DSCFM = 843       * STACK DSCFM = 49       * STACK DSCFM = 193					<b>MOL NT NET = 27.2</b>	29
STACK AREA = 1.83       STACK AREA = 0.35       STACK AREA = 0.52         STACK ACFM = 1/580       STACK ACFM = 72       STACK ACFM = 348         * STACK DSCFM = 843       * STACK DSCFM = 49       * STACK DSCFM = 193						
STACK ACFM = 1,580.       STACK ACFM = 72.       STACK ACFM = 348.         * STACK DSCFM = 843.       * STACK DSCFM = 49.       * STACK DSCFM = 193.						
* STACK DSCFM = 843.						
154	# 51HUR DSUPR = 843	•		•	4 STUCK BOOLD 2 150	••
			154			

		KRON "METH 5"
XROM "METH 5"	XROM "METH 5"	RUN HUMBER
BLDG 1946, BOILER 1	RUN NUMBER BLDG 1102, BOILER 1	BLDG 1130, BOILER 1 Run
RUN METER BOX Y?	RUN METER BOX Y?	METER BOX Y? 1.0770 RUN
1.0770 RUN DELTA H?	1.0770 RUN DELTA H?	DELTA H? 1.4000 RUN
1.4000 RUN BAR PRESS ?	1.4000 RUH	BAR PRESS ? 29.6350 RUN
29.8150 RUN METER VOL ?	BAR PRESS ? 29.8150 RUN	METER VOL ?
22.7650 RUN MTR TEMP F?	METER VOL ? 22.5768 RUN	MTR TEMP F?
96.0000 RUN	HTR TEMP F? 87.7000 RUN	% OTHER GAS
% OTHER GAS REMOVED BEFORE	% OTHER GAS REMOVED BEFORE	REMOVED BEFORE DRY GAS NETER ?
DRY GAS METER ?	DRY CAS METER ?	STATIC HON IN ?
STATIC HOH IN ? ~.0550 RUN	STATIC HOH IN ? 0400 RUN	-,1600 PUN STACK TEMP.
STACK TEMP. 358.0000 RUN	STACK TEMP. 237.7000 RUN	407.9000 RUN
ML. WATER ? 71.0000 RUN	ML. WATER ?	ML. WATER ? 48.1000 RUN
IMP. % HOH = 12.6	54.7000 RUN IMP. % HOH = 9.9	IMP. 4 HOH = 9.0
% HOH=12.6	; % HOH=9.9	% нон=9.0
4 (19)	!	% C62?
% CO2? 8.0000 RUN	% CO2? ! 8.0000 RUN	7.0000 RUN % OXYGEN?
% OXYGEN?	% OXYGEH? 8.0000 RUH	11.0000 RUN % CO ?
% CO ?	2 CO ?	RUN
RUN MOL HT OTHER?	MOL NT OTHER?	MOL NT OTHER?
RUN	Mud =29.60	MWd =29.56
MWd =29.60 MW MET=28.14	MW WET=28.45	MW WET=28.52
	2005 2053 2	SORT PSTS ?
SQRT PSTS ? 6.1812 RUN	SQRT PSTS ? 6.0948 RUN	11.3643 PUN TIME NIN ?
TIME MIN ? 40.0000 RUN	TIME MIN ? 40.0000 RUN	40.0000 PUK
RUN	RUN	STK BIR INCH ?
STK DIA INCH ?	STK DIA INCH ? 9.7500 RUN	10.000 PUN
15.0000 RUH	* VOL MTR STD = 23.438	* YOL MTR STD = 22.828
* VOL MTR STD = 23.282  STK PRES ABS = 29.81  VOL HOH GAS = 3.34  % MOISTURE = 12.55  MOL DRY GAS = 0.874  % HITROGEN = 84.00  MOL MT DRY = 29.60  MOL MT MET = 28.14  VELOCITY FPS = 15.32  STACK AREA = 1.23  STACK BSGFM = 635.	STK PRES ABS = 29.81  YOL HOH GAS = 2.57  % MOISTURE = 9.98  MOL DRY GAS = 8.981  % NITROGEN = 84.88  MOL WT DRY = 29.68  MOL WT WET = 28.45  YELOCITY FPS = 15.83  STACK ARER = U.54  STACK DSCFM = 318.	STK PRES ABS = 29.62  YOL HOH GAS = 2.26  % MOISTURE = 9.02  MOL DRY GAS = 0.910  % HITROGEN = 82.00  MOL HT DRY = 29.56  MOL HT HET = 28.52  YELOCITY FPS = 28.08  STACK AREA = 0.55  STACK DSCFM = 919.  * STACK DSCFM = 504.
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XROH THETH 5"	XROM THETH 5"	XRON -METH 5-
RUN NUMBER	RUN NUMBER	RUN HUMBER
BLDG 1200, BOILER 81	BLDG 1200, BOILER 2	BLDG 1200, BOILER A/3
RUH	RUN POY YO	, RUN
METER BOX Y?	METER BOX Y?	METER BOX Y? 1.0770 RUH
1.0779 RUN	DELTA H?	DELTA H?
DELTA H?	1.5780 RUN	1.3000 RUN
1.3700 RUN	BAR PRESS ?	BAR PRESS ?
BAR PRESS ?	29.9450 RUN	29.9290 RUN
29.9450 RUN	METER VOL ?	METER VOL ?
METER VOL ?	25.3220 RUN	25.4150 RUN
26.9288 RUN	MTR TEMP F?	NTR TEMP F?
HTR TEMP F? 89.4888 RUN	121.4000 PUN	107.5000 RUN
89.4000 RUN % OTHER GAS	% OTHER GAS	% OTHER GAS
REMOVED BEFORE	REMOVED BEFORE	REMOVED BEFORE
DRY GAS METER ?	DRY GAS METER ?	DRY GAS METER ?
RUN	RUH	RUN
STATIC HOH IN ?	STATIC HOH IN ?	STATIC HOH IN ?
0450 RUN	0450 RUN	0900 RUN
STACK TEMP.	STACK TEMP.	STACK TEMP.
369.1000 RUN	266.2000 RUN ,	281.6000 RUN
ML. WATER ?	ML. WATER ?	ML. WATER ?
58.9000 RUK	75.0000 RUN	66.3000 PUN
IMP. % HOH = 9.0	IMP. % HOH = 12.4	IMP. % HOH = 10.9
		% HOH=10.9
1 нОН=9.0	% HOH=12.4	4 HUN-1815
% 002?	% CO2?	% CO2?
6.8000 RUN	7.0000 RUN	8.0000 RUN
% OXYGEN?	2 DXYGEN?	% OXYGEN?
11.4000 RUN	11.0000 RUN	8.0000 RUN
% CO ?	7 00 ?	% CO ?
RUN	RUN	RUN
MOL NT OTHER?	MOL NT OTHER?	MOL NT OTHER?
RUN	PUN	RUN
WILL 00 E4		MWd =29.68
MNd =29.54	MMd =29.56	MW MET=28.34
MW WET=28.50	MW WET=28.12	11# ME(-20.04
	1	
SQRT PSTS ?	SQRT PSTS ?	SURT PSTS ?
9.1134 PUN	4.6228 RUN	8.1510 RUN
TIME MIN ?	TIME MIN ?	TIME HIN ?
48.0000 RUH	48.0000 RUN	48.0000 RUN
	ALC: COMPANY	
RUN	.#### RUN	RUN
STK DIA INCH ?	STK DIA INCH ?	STK DIA INCH ?
9.6300 RUN	9.6300 RUN	9.6300 RUN
* YOL MTR STD = 27,989	* YOL MTR STD = 24.883	* VOL MTR STD = 25.556
STK PRES ABS = 29.94	STK PRES ABS = 29.94	STK PRES ABS = 29.92
VOL HOH GAS = 2.77	VOL HOH GAS = 3.53	VOL HOH GAS = 3.12
% MOISTURE = 9.01	% MOISTURE = 12.42	% MOISTURE = 10.88
MOL DRY GAS = 0.910	MOL DRY GAS = 0.876	MOL DRY GRS = 0.891
% NITROGEN = 81.80	% HITROGEN = 82.00	% NITROGEN = 84.00
MOL HT DRY = 29.54	MOL NT DRY = 29.56	MOL MT DRY = 29.60
MOL WT WET = 28.50	MOL NT NET = 28.12	MOL HT HET = 28.34
VELOCITY FPS = 22.40	VELOCITY FPS = 11.44	VELOCITY FPS = 20.10
STACK AREA = 0.51	STACK AREA = 0.51	STACK AREA = 0.51
STACK ACFM = 680.	STACK ACEM = 347.	STACK ACEM = 610.
* STACK BSCFM = 394.	* STACK BSCFM = 221.	* STACK DSCFM = 387.
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WARM SMETH EA	XRON -METH	5- VOOM -METU 5-
XRON *METH 5*	RUN HUMBER	5" XROM "METH 5" RUN NUMBER
RUN NUMBER	BLDG 1402, BOILER 1	BLDG 1422, BOILER 1
BLDG 1206, SMALL BOILER RUN		RUN .   RUN
	METER BOX Y?	HETER BOX Y?
METER BOX Y? ↓ 1.0770 RUN		RUN 1.0770 RUN
••••	DELTA H?	DELTA H?
DELTA H? 1.2500 RUN		RUN 1.4000 RUN
BAR PRESS ?	BAR PRESS ?	BAR PRESS ?
29,8498 RUI		RUN 29.8500 RUN
METER VOL ?	METER VOL ?	METER VOL ?
25,6368 RUI		RUN 21.8730 RUN
HTR TEMP F?	MTR TEMP F?	MTR TEMP F?
98.2500 RU	88.9800	RUN 93.9000 RUN
% OTHER GAS	% OTHER GAS	. % OTHER GAS
REMOVED BEFORE	REMOVED BEFORE	REMOYED BEFORE
DRY GAS METER ?	DRY GAS METER ?	DRY GAS METER ?
RIJ		RUN RUN
STATIC HOH IN ?	STATIC HOH IN?	STATIC HOH IN ?
-,0050 RU		RUN0100 PUN
STACK TEMP.	STACK TEMP.	STACK TEMP. RUN 241.6888 PUN
238.1996 RU		
ML. WATER ?	ML, MATER ? N 51.6000	ML. WATER ? RUN 66.8000 PUN
65.4000 PL		
IMP. % HOH = 10.5	IMP. % NOH = 9.5	IMP. % HOH = 12.3
% HOH=10.5	% HOH=9.5	% HOH=12.3
4 100 1515		
t. 2060 ·	v co22	<b>%</b> 202?
% 002? <b>7.0000 R</b> U	% CO2? N 7.0000	RUN 7.0000 RUN
7.0000 RU % OXYGEN?	% OXYGEN?	% OXYGEN?
4 UATGEN? 11,0000 RU		RUN 11.0000 RUN
3 CO ?	% CO ?	% CO ?
RL RL		RUN RUN
MOL MT OTHER?	MOL HT OTHER?	MOL NT OTHER?
RL	•	RUN RUN
MUJ =00 57	MHd =29.56	MWd =29.56
MWd =29.56 MW WET+28.34	MW WET=28.46	MW WET=28.14
nm	139 WEY-20.40	THE ACT CONT.
SORT PSTS ?	SQRT PSTS ?	SORT PSTS ?
3.1988 RL		RUH 3.7343 RUN
TIME MIN ?	TIME MIN ?	TIME MIN ?
48.9899 RU		RUN 49.9999 RUN
		NO.
. RI		PUN RUN
STK DIR INCH?	STK DIA INCH ?	STK DIA INCH ? Run 17.5000 Run
13.88 <del>00</del> Ri	IN 10.7500	RUN 17.5000 RUN
* VOL MTR STD = 26.124	* VOL HTR STB = 23.13	32 * VOL MTR STB = 22.488
STK PRES ABS = 29.84	STK PRES ABS = 29.8	
VOL HOH GAS = 3.08	VOL HOH GAS = 2.43	<b>VOL HOH GAS = 3.14</b>
% MOISTURE = 18.54	% MOISTURE = 9.50	% MOISTURE = 12.27
MOL DRY GAS = 0.895	MOL DRY GAS = 0.905	
% NITROGEN = 82.00	% NITROGEN = 82.00	% HITROGEN = 82.00
MOL WT DRY = 29.56	MOL HT DRY = 29.56	MOL WT DRY = 29.56
MOL WT WET = $28.34$	MOL WT WET = 28.46	MOL HT HET = 28.14
VELOCITY FPS = 7.88	VELOCITY FPS = 10.	
STACK AREA = 1.85	STACK AREA = 0.63	STACK AREA = 1.67
STACK ACEM = 497.	STACK ACFM = 406.	STACK ACEM = 927.
* STACK DSCFM = 335.	* STACK DSCF# = 270.	* STACK DSCFM = 611.

XRON -HETI	u 5• 1	XROM - MET	H 5*	Z XRON *NE1	ru 5+
RUN NUMBER	,	RUN HUMBER	,	ERUN HUMBER	, ·
BLDG 1604, BOILER 1	RUN	BLDG 1614, BOILER 2	RUN	BLDG 16#4, BOILER 1	RUN
METER DAY V2	KUII	METER BOX Y?	į	METER BOX Y?	KUN
METER BOX Y? 1.0770	RUN	1.0779	RUN	1.0770	RUN
DELTA H?		DELTA H?		DELTA H?	
1,4000	RUN	1.4000	RUN	1.4989	RUN
BAR PRESS ?	}	BAR PRESS ?	0.111	BAR PRESS ?	
29.8 <del>0</del> 60	RUN	29.8969	RUN	29.8060	RUN
METER VOL ?		METER VOL ? 22.8700	RUH	METER VOL ?	01111
22.6458	RUN	MTR TEMP F?	F. 011	22.7580	blih
HTR TEMP F? 104.5000	RUN	88.6888	RUN	MTR TEMP F? 107.6000	RUN
ኒ OTHER GAS	KON	% OTHER GAS		% OTHER GAS	KUN
REMOVED BEFORE		REMOVED BEFORE		REMOVED BEFORE	
DRY GAS METER ?		DRY GAS METER ?		DRY GAS METER ?	
2	RUN		RUH	• • • • • • • • • • • • • • • • • • • •	PUK
STATIC HOH IN ?		STATIC HOH IN ?	OUN	STATIC HOH IN ?	
-,0709	PUN	0100	KIIH	0100	RUH
STACK TEMP.	******	STACK TEMP. 260.3000	RUH	STACK TEMP.	<b>5</b>
151.8000	RUH	ML. WATER ?	KUU	272.5000	RUN
ML. WATER ?	RUH	52.3000	RUN	ML. WATER ?	BÜH
57.2000 IMP. % HOH = 10.6	ן	IMP. % HOH = 9.4		57.7000 IMP, % HOH = 10.6	# CU
THE THOM TOTAL	į	111) 4 14 11011	!	INP. 4 NON - 18.0	
% нон=10.6	1	% НОН=9.4		% HOH=10.6	
	1				
% CO2? <b>7.9000</b>	RUN	% CO2?	RUN	% CO2?	DIU:
2 DXYGEN?	F.U.	7.0000 % OXYGEN?	KO.,	7.0000	ЫÜМ
11.0000	RUH	11.0000	RUH	% OXYGEN? 11.0000	RUN
2 00 ?		% CO ?		7 CO ?	NON.
	RUN		RUN	4 00	RUN
MOL WT OTHER?		NOL WT OTHER?	l	HOL WI OTHER?	
	RIJN		RUM		RUN
MWd =29.56		MWd =29.56	1	MWd =29.56	
MN WET=28.34	!	MW WET=28.47		MM MET=28.33	
SQRT PSTS ?		SQRT PSTS ?		SORT PSTS ?	
8.8416	RUN	4.8660	RUN	4.6759	RUH
TIME MIN ?	•	TIME MIN ?		TIME HIN ?	
49.0000	RUH	40.0000	PUN	40.0000	ЫÜМ
	RUN		RUN		D
STK DIA INCH?	KUN	STK DIA INCH?	KUN	ATH BIG THEN S	RUH
7.5000	RUN	16.0000	หมูด	STK DIA INCH ? 16.0000	RUN
7.000	• • • • • • • • • • • • • • • • • • • •	1010003		10.0000	Non
* YOL MTR STD = 22.		* VOL MTR STD = 23		* YOL MTR STB = 22.	.792
STK PRES ABS = 29		STK PRES ABS = 2		STK PRES ABS = 25	
VOL HOH GAS = 2.6		VOL HOH GRS = 2.4	L L	VOL HOH GRS = 2.7	
% MOISTURE = 10.5 MOL DRY GAS = 0.8		% MOISTURE = 9.4 MOL BRY GAS = 0.		% MOISTURE = 10.0	
% NITROGEN = 82.8		% NITROGEN = 82.		MOL DRY GAS = 0.9 % NITROGEN = 82.0	
MOL MT DRY = 29.5		MOL HT DRY = 29.		MOL NT DRY = 29.	
MOL WT WET = 28.3		MOL NT WET = 28.		HOL NT WET = 28.	
VELOCITY FPS = 21		VELOCITY FPS = 1		VELOCITY FPS = 1	
STACK AREA = 0.31	l	STACK AREA = 1.4		STACK AREA = 1.4	
STACK ACFM = 402.		STACK ACFM = 1.0		STACK ACFM = 968	
* STACK DSCFM = 309	),	* STACK DSCFM = 66	5.	* STACK DSCFM = 62	1.
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